Secondary school students' university readiness and their transition to university

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CHAPTER 1

Introduction

"For me, university is like a big black hole. I'll just jump in and see what happens."

Grade 12 secondary school student

1.1 Introduction

Are students who graduated from secondary education ready for university? More specifically, are they ready to adjust academically? Many of the 47,316 students who started their university studies in the Netherlands in September 2016 (VSNU, 2017a) have probably not given this question much thought. Going to university is an exciting new phase in life, with all the adventures that come with it, especially for students who move out of their parents' house and start to live on their own in a new city. However, many students do not know what to expect or have unrealistic expectations about university in general (Heublein et al., 2017; Smith & Wertlieb, 2005) or about the specific degree programme they have chosen to pursue (De Buck, 2009). Even despite the lack of (accurate) expectations, the transition from secondary education to university may turn out quite well if the student finds himself or herself fit in perfectly into the new environment. However, for a substantial number of students this is not the case. In the Netherlands, 33% of all first-year students in the academic year 2014/2015 did not continue in the same degree programme they had started: 7% left university altogether and 26% switched programmes (Inspectorate of Education, 2017). Apart from the negative consequences this has for universities regarding costs and success rates, it could also have negative psychological and financial effects on the student, e.g., the feeling of failure and the loss of money on an unfinished study programme. Moreover, the number of students who do not cope with the transition effectively is probably a lot higher than these dropout rates suggest, since not all students who have a difficult time will quit or switch. In a sample of first-year students at a university in the United Kingdom, Lowe and Cook (2003) found that one out of four to one out of three students faced considerable difficulties in adjusting to postsecondary education. These adjustment difficulties may cause academic problems, such as underachievement, and psychological problems, like depression (Leung, 2017; Lowe & Cook, 2003).

Besides the mismatch between expectations and reality, there are several other reasons for dropping out, switching programmes, and going through a difficult stage in life during the transition to university. An important reason concerns the difference between the heavily regulated secondary school learning environment and the university environment that makes a strong appeal to a student's self-regulation capacities, in combination with a significant increase in the amount and complexity of study content. A lot of research into first-year

success confirmed that a substantial number of students struggle with time management and self-regulation, especially in the first semester (e.g., Haggis, 2006; Van der Meer, Jansen, & Torenbeek, 2010). Even for highly able students the required self-regulation and time management skills can be problematic, because many of them went through secondary school without having to exert much effort and therefore never felt the need to learn how to learn (Balduf, 2009; Grobman, 2006). Wintre et al. (2011) reported that as many as half of all university students obtained a lower GPA in university than they did in secondary school.

Fortunately, improving university students' success is a primary concern of the Dutch government and of the universities and thus receives a lot of attention. Measures that have been taken to improve retention and decrease delay include 'matching', the binding study advice (BSA), and the incorporation of learning communities in first-year programmes. Matching (sometimes referred to as the study choice check) is a procedure with the goal of obtaining an optimal fit between the student's capacities and interests and a degree programme. Moreover, it aims to make sure the student has realistic expectations of the programme he or she plans to pursue. Matching is mandatory: Once a student applies for a degree programme, he or she has to undergo the matching procedure. Universities are free to choose what matching activities they offer, which has the consequence that these activities vary from having students complete a short questionnaire or participate in an intake interview to having students take part in a class and in some cases even take a test to see to what extent the student is able to handle the content of that class. Results of the matching procedure are informative only and do not deny a student access to the degree programme. As such, matching does not serve as a selection mechanism for institutes, but intends to function as a self-selection mechanism by showing students to what extent a programme suits them. The BSA refers to a binding advice the student receives after one year of study. This advice can be positive or negative. In the latter case, a student is not allowed to continue the programme. A student receives a negative BSA when he or she does not obtain a certain minimum of credit points after one year of study. Programmes can decide upon their own threshold. For many programmes, the minimum number of credits required is 45 (out of 60), but in some programmes it is as high as 60. Preliminary research showed different effects of the BSA on student success. Arnold (2015) found that in large degree programmes the BSA had a positive effect on time-to-degree, but De Koning, Loyens, Rikers, Smeets, and Van der Molen (2014) found no differences in achievement between a BSA cohort

and a pre-BSA cohort. Another measure which is more and more often applied in university programmes to increase student success is the implementation of learning communities. Learning communities are a form of small-scale teaching. One of the goals of learning communities in the first year is that students adjust faster to university as a result of close peer collaboration and close contact with a teacher or mentor. Although learning communities have positive effects on friendship formation and self-efficacy, in practice, academically able students often pair up with each other, as do the academically less able students, which may lead to segregation (Brouwer, 2017). Since these are all recent initiatives, there is not much information available regarding their (long-term) effects on student success. In any case, it is clear that plenty of effort is devoted to improving student success in universities and that it is a well-researched area: A substantial number of studies have been published in the research area of postsecondary student success, especially on first-year success, since research showed that a student's success in the first year is indicative of his or her success in subsequent years (Hurtado, Han, Sáenz, Espinosa, & Cabrera, 2007; Jansen & Bruinsma, 2005).

In contrast, not much attention has been given to the pre-transition phase. What factors are related to students' readiness for university before they make the transition? Can successful and less successful university students already be identified in secondary school? Do secondary school teachers believe preparing their students for university is part of their job? How do they contribute to their students' readiness? In this thesis, we will answer these questions as well as questions that are related to students' academic adjustment and success once they are in the first year of university. In this Introduction, first, the concept of transition will be described. Then, we will elaborate on the Dutch context of this research and the generalisability to non-Dutch education systems. Third, university readiness will be defined and conceptualised and we will give a brief overview of previous research into university readiness. Next, theories in the broader research area of student success in higher education will be discussed, after which we zoom in on the concepts that play the leading and supporting parts in our studies. Finally, after having described the main aims and research questions, we will give an overview of the five chapters that form the body of this thesis.

1.2 The transition issue

Students face different transitions during their educational career: They start school, they move from Kindergarten to grade 1, from primary to secondary education, and from secondary to postsecondary education. Depending on the education system of a country, there may be even more transitions, e.g., from primary to middle school in the United States or from one level of secondary education to a higher or lower level of secondary education in countries with a differentiated secondary school system such as the Netherlands. Each transition comes with its own challenges, but the transition from secondary to higher education can be perceived as particularly challenging, as it coincides with the life transition into adulthood, which is often linked to increases in risk-taking behaviour (Fromme, Corbin, & Kruse, 2008; Schulberg & Maggs, 2002; White et al., 2006). About one third of all students in the Netherlands move out of their parental house when they start their postsecondary studies (Kences, 2016), which means that for many students the transition not only entails academic but also social adjustment to the new situation, e.g., dealing with freedom and independence.

Chickering and Schlossberg (2002) define a transition as an event that results in changed relationships, routines, assumptions, and roles to which the one undergoing the transition has to adjust. Schlossberg (2008) developed a model of four resources that have an impact on how well a person deals with a transition: situation, support, self, and strategies. These resources may be positive, i.e., assets, or negative, i.e., liabilities. While Schlossberg refers to transitions in general, we will discuss the four types of resources with the transition from secondary school to university in mind. The first one, *situation*, concerns the situation in which the student faces the transition. An important situational characteristic of the transition from secondary school to university is that this transition is anticipated, which means that a student can (be) prepare(d) for it. Another situational aspect relates to the timing of the transition. An example is that when a student faces other major life events simultaneous to the transition to university, the timing can be bad. Furthermore, the situation is influenced by whether or not the student has dealt with similar transitions before and how these transitions were experienced. Students who experienced a very difficult transition from primary to secondary education may be extra anxious with regard to another educational transition. Next, *support* refers to the extent and quality of available support systems. Important sources of support can be 1) family members, especially for continuing-generation

students (i.e., students whose parents have also attended university); 2) peers, in particular if they will start at the same university; 3) secondary school teachers with whom the student has a good relationship and who may have studied a similar degree as the one the student is about to embark on; 4) student organisations in the university environment, e.g., study associations, fraternities and sororities, and sports clubs, and 5) university faculty members who may take on a mentoring role for first-year students. Third, *self* refers to factors belonging to the individual: personal and demographic factors and psychological characteristics. Especially the latter have great impact on how a student deals with the transition. Several self factors will be discussed extensively throughout this thesis. Last, *strategies* are coping responses, i.e., the way in which the student deals with the transition. Schlossberg (2008) distinguishes four main possible responses of dealing with the change caused by a transition: 1) modifying the situation; 2) changing the meaning of the situation; 3) controlling and managing the situation; and 4) taking deliberate inaction. Coping responses that imply action and initiative from the student (e.g., managing the situation by actively seeking for help or by learning new ways to study) are more useful in the process of adaptation to university than the last response, which is for example when students procrastinate their study activities because they have no idea where to start or find the content too difficult. In addition to the self factors, we will focus on students' strategies to deal with the transition by looking at academic adjustment.

1.3 The transition in the Netherlands: Context and generalisability

Research into educational transitions is important because transitions entail risk due to the gap between the delivering and receiving institution. These problems are prominent worldwide, as for example evidenced by the large amount of research in Australia focusing on the first-year experience and the attention paid to college readiness in the United States. Moreover, first-year dropout rates are high in many countries, for example about one third in the United States (National Student Clearinghouse, 2014) and one fifth in Australia (Hare, 2016). Research into transitions that looks at both secondary schools and universities may contribute to a decrease in these high dropout rates.

The education system in the Netherlands particularly lends itself for transition research due to the high level of external differentiation. After eight years of primary education (including Kindergarten), children are allocated to one of the three levels of secondary education, based on their cognitive abilities as examined by a national test and judged by primary school teachers. The highest level of secondary education is called 'voorbereidend wetenschappelijk onderwijs (vwo)', which literally translates as 'preparatory university education' or, in short, pre-university education. Pre-university education takes six years (from grade 7 to grade 12) and is attended by about 20% of all secondary school students (CBS, 2016). Graduating from pre-university education provides students with an entrance ticket to university, with for some university degree programmes additional requirements regarding the completed secondary school coursework. Approximately 80% of all pre-university students enter university directly after graduation (CBS, 2016). Of the remaining 20%, many do so after a gap year. This then makes preparing for the transition to university a main goal of pre-university education, as the vast majority will experience this transition.

Compared to comprehensive systems, in which secondary school graduates will enter different types of postsecondary education or the labour market, this relative homogeneity in the next step can be seen as a benefit: It should be easier to specifically prepare all students for one type of postsecondary education than to make sure some of them are adequately equipped for higher education, some for vocational training, and others for the labour market. Consequently, the research in this thesis is specifically transferable to countries that have education systems in which students are also streamed into different levels of secondary education (i.e., where there is at least a distinction between an academic and a vocational track), such as Austria, Germany, Greece, Ireland, Russia, and Switzerland (Buchmann & Park, 2009). Nevertheless, the results also hold value for comprehensive systems, since in many of these systems there is some degree of internal differentiation, e.g., Advanced Placement (AP) and International Baccalaureate (IB) courses in the United States. These courses contain rigorous, college-level coursework and their aim is to prepare students for postsecondary success (Santoli, 2002). In that sense, this is comparable to the Dutch pre-university secondary school track. With regard to AP, Dougherty, Mellor, and Jian (2006) even claim that the percentage of students who take and pass AP exams is an indicator of the percentage of students a school is preparing to graduate from college. Moreover, since AP or IB course completion is often required for entry into specific college

or university programmes, students who take these courses will mainly consist of students who aspire further education, and hence will be the target audience for university preparation.

1.4 What is university readiness and what do we know about it?

The more a secondary school student is 'ready' for university, i.e., well-prepared for its demands, the more successful his or her transition is likely to be. However, especially in Europe, not much research has specifically focused on university readiness. A common conception by both secondary school teachers and university lecturers is that someone who is eligible for university – i.e., holds the diploma that grants access to university – should be sufficiently prepared. High dropout rates unfortunately show that this is not necessarily the case. Clearly, university readiness entails more than having successfully completed secondary education: University eligibility does not equate university readiness. In the United States, college readiness has gained quite some attention in research, policy, and practice. It is recognised as an urgent problem in education, since about a third of first-year students in public universities need to take remedial courses (Bettinger & Long, 2009), many students struggle, and a substantial number even drop out eventually (e.g., Roderick, 2006). An influential researcher in the area of college readiness is David Conley, who emphasises that it takes more than mastering secondary school content knowledge to be successful in postsecondary education. We draw on his research and define university readiness as the degree to which previous educational and personal experiences have equipped a student for the expectations and demands they will encounter in university (Conley, 2008). What does this 'equipment' consist of? According to Conley, there are four keys to college readiness: cognitive strategies, content knowledge, learning skills and techniques, and transition knowledge. Figure 1.1 shows these keys and the subfactors within these keys. We will now briefly discuss these keys and their relevance to university readiness in the Netherlands.

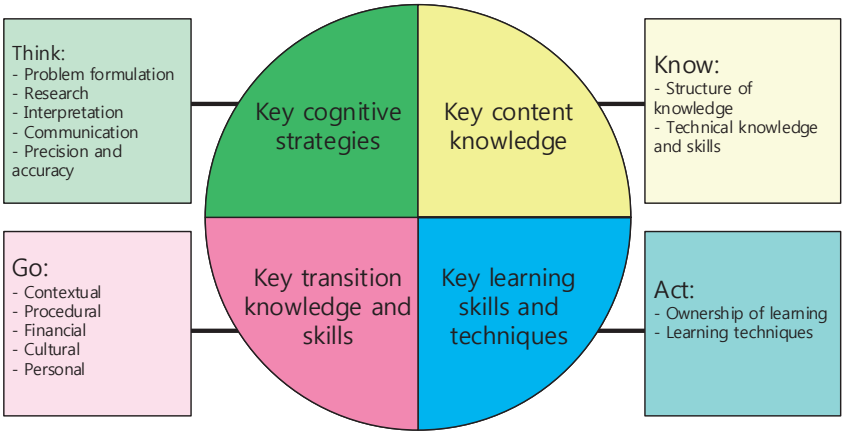

Figure 1.1 Conley's model of college readiness (adapted from Conley & French, 2014)

Cognitive strategies are ways of thinking and working that are required in a postsecondary learning environment, such as critical thinking, analytical thinking, research skills, reasoning, and accuracy. These are especially relevant for Dutch university education, as all universities are research universities and much of the learning content is research-based. *Content knowledge* is about students having to master the key knowledge and skills from the core subjects as well as overarching skills such as understanding the structure of knowledge. Important parts of key content knowledge are for example reading and writing skills, not only in Dutch, but also in English, since about one third of university programmes are taught in English (20% of all bachelor programmes in the Netherlands are completely taught in English and another 10% partly; VSNU, 2017b). The third key of readiness, *learning skills and techniques*, consists of academic behaviours and beliefs necessary for postsecondary success. These can be described as habits of mind or academic behaviours and include motivation, time management skills, study skills, persistence, and self-efficacy. There is an abundance of research confirming the importance of these aspects for success in higher education (e.g., Richardson, Abraham, and Bond, 2012; Robbins et al., 2004). Last, *transition knowledge and skills* refer to the information and skills that students need to actually start a degree, e.g., information about degree programmes and self-knowledge in order to make a suitable choice; financial information; and the skills needed to navigate the new environment. The importance of this key cannot be underestimated, since research shows that many students drop out because they have made the wrong choice or because their expectations have not met reality, which caused them to be

demotivated (e.g., Heublein et al., 2017). Research thus confirms the importance of these four keys for readiness for postsecondary education, and it is clear that secondary school students differ substantially in these keys, and consequently in their level of college readiness (Kless, Soland, & Santiago, 2013).

In this thesis, we look at several factors of university readiness that can be assigned to these four keys, e.g., students' cognitive engagement with learning (cognitive strategies) and their use of metacognitive and self-regulated learning strategies (learning skills and techniques). Moreover, we focus on many motivational aspects, such as academic interest and academic self-efficacy, which Conley also classifies under learning skills and techniques (Conley, 2012).

Important to bear in mind is that like Conley's model of readiness, this thesis focuses on the academic side of the transition. While acknowledging that social and emotional aspects also play an influential role in the process of making the transition from secondary school to university (e.g., Pitmann & Richmond, 2008; Wintre & Yaffe, 2000), this is beyond our current scope. In addition to the need to demarcate the research project, an important reason to focus on the academic side of the transition is that research consistently showed that academic adjustment is a more important predictor of postsecondary success than social adjustment (Rienties, Beausaert, Grohnert, Niemantsverdriet, & Kommers, 2012). Furthermore, our interest lies in student characteristics, which means that we do not take into account learning environment characteristics, although these also play a role in the transition. Torenbeek (2011) found, for example, that if the learning environment in university was slightly more student-centered (e.g., active involvement, many assignments) than in secondary school, students were more successful.

1.5 Theoretical background: Theories and constructs

It becomes clear that hardly any research in Europe specifically focuses on university readiness. Due to this limitation in available research, the theoretical framework that underlies this thesis mainly draws on research on first-year student success – in addition to the transition theory and the model of college readiness discussed above. Two main student success theories are discussed below, followed by an overview of individual constructs that (may) impact secondary school students' university readiness and university students' achievement and persistence in the first year.

1.5.1 Theories of student success in higher education

One influential theory of student success in higher education is Astin's (1999) theory of student involvement. This theory is built on an input-throughput-output model, where the input consists of a student's background and previous experiences, the throughput is how the student experiences college, and the output involves the student's characteristics after he or she has graduated, e.g., knowledge and attitudes gained from the college experience. According to Astin, student involvement is vital to the college experience: Being continuously involved, i.e., investing cognitive energy, is related to academic performance. Many researchers have built on Astin's theory and study student involvement as a main predictor of achievement in higher education, such as Kuh and Pike (e.g., Kuh, 2009; Kuh, Cruce, Shoup, Kinzie, & Gonyea, 2008; Pike & Kuh, 2005; Pike, Kuh, & Massa-McKinley, 2008). Nowadays, this work is mainly referred to as research about student engagement. A review by Pascarella and Terenzini (1991, p. 610) even concluded that "one of the most inescapable and unequivocal conclusions we can make is that the impact of college is largely determined by the individual's quality of effort and level of involvement in both academic and non-academic activities". Following from this, the concept of engagement plays an important role in our studies.

A second important theory we draw on is Tinto's (1975) theory of student attrition. The central idea in this theory is that attrition is related to a student's academic and social integration, which in turn influence and are being influenced by the level of goal commitment and institutional commitment. Moreover, a student's characteristics (e.g., individual attributes, prior education, demographic characteristics) and characteristics of the institution (e.g., features of the learning environment) have an impact on goal commitment and institutional commitment. This is a continual process; a student's level of commitment is subject to change during the time he or she is in college. Tinto's theory remains influential in higher education research, especially in research about psychosocial processes in higher education (e.g., Clark, Middleton, Nguyen, & Zwick, 2014; Collings, Swanson, & Watkins, 2014; Dika & D'Amico, 2016), although not all relationships postulated in the model are backed by empirical evidence and the model as a whole has been criticised (Brunsden, Davies, Shevlin, & Bracken, 2000). With its focus on integration, Tinto's theory is particularly useful for studying the transition from secondary school to university. In this thesis, our conceptualisation of academic adjustment, which receives attention in several of our studies, relates to Tinto's concept of academic integration.

1.5.2 Overview of constructs that may impact a student's transition

In the following part, we present a sneak preview of the constructs that will appear throughout this thesis as (possible) influencers of university readiness and/or success in university. Some of them are lead players who appear regularly in the different chapters, e.g., academic adjustment and academic motivation, whereas others play a smaller – but by no means insignificant – part. We will now define these factors and explain why they may matter in the transition.

Academic adjustment (Chapters 3, 5, and 7)

We start by addressing the notion of academic adjustment, as it serves a double role in this thesis: In Chapter 3 it is an explanatory factor, in Chapter 5 an outcome factor, and in Chapter 7 both. Basically, academic adjustment can be perceived as the operationalisation of a successful transition. As we discussed above, a transition implies change in relationships, routines, assumptions, and roles (Chickering & Schlossberg, 2002) and this change calls for adaptation (Schlossberg, 2008). The better a student adjusts to the new situation, the better the transition. In that way, the extent of adjustment is the result of a student's interaction and experience with the new learning environment. We follow Baker and Siryk's (1989) definition and define academic adjustment as the ability to cope with the academic demands of the university environment. It consists of four distinguishable aspects (Baker & Siryk, 1989). The first one is *motivation*, which refers to being motivated to learn and having clear academic goals. The second aspect, *application*, concerns the extent to which a student applies himself or herself to academic work. *Performance* is the third aspect, which is about how well the student succeeds in meeting the academic demands. Last, *environment* refers the student's satisfaction with several characteristics of the new learning environment, e.g., the content of the courses and quality of instruction. Taken together, these four aspects form the construct academic adjustment and provide an adequate measure of how successful a student's transition was. Separately, the aspects provide a more detailed insight into a student's experience of the transition. In Chapter 5, where we were interested in differences between students as to how successful their transition was, we used academic adjustment as an outcome variable. In Chapter 7, we investigated which factors were related to academic adjustment and what the magnitude was of the impact of academic adjustment on the three outcome variables of student success in university: GPA, number of obtained credits, and the intention to persist. The rationale in this chapter is that much research has pointed at the importance

of academic adjustment by showing its relationship with student success (e.g., Kennedy, Sheckley, & Kehrhahn, 2000; McKenzie & Schweitzer, 2001; Rienties, Beausaert, Grohnert, Niemantsverdriet, & Kommers, 2012), but that it is not yet clear whether adjustment has differential effects depending on which outcome measure of success is used. Moreover, not many studies have investigated what factors influence student's academic adjustment.

Need for cognition (Chapters 4 and 5)

When you think about what a typical university student needs in order to be successful, a characteristic that quickly comes to mind is curiosity. Ideally, university students should be driven by a hunger for knowledge, since they would have to study theories, concepts, laws, etc. – large amounts of theoretical knowledge. People with a hands-on mentality, who like to directly apply knowledge and are not necessarily interested in how or why things work the way they do, may not fit well in a university environment. This 'eager for knowledge' is nicely captured in the concept of need for cognition, which Cacioppo, Petty, Feinstein, and Jarvis (1996, p. 197) define as a personality variable that describes "an individual's tendency to engage in and enjoy effortful cognitive endeavours". Cacioppo et al.'s (1996) detailed overview of research results regarding need for cognition confirms that this can be seen as a desirable or even indispensable attribute of a university student: Among other things, individuals high in need for cognition make sense of difficult information more easily; actively seek for information and think about and reflect on things more often; hold a more positive attitude towards tasks that require problem solving and reasoning; and put more effort into processing information. Research also showed that individuals high in need for cognition have more intrinsic motivation to learn (Amabile, Hill, Henessey, & Tighe, 1994); more frequently use deep learning strategies; have more adaptive control over their attention and cognition (Evans, Kirby, & Fabrigar, 2003); and obtain higher grades in both secondary and postsecondary education (Luong et al., 2017; Richardson et al., 2012). Luong et al. (2017) even suggested that the influence of need for cognition on achievement grows over the school years. Furthermore, Grass, Strobel, and Strobel (2017) recently investigated the relevance of need for cognition for both performance and affective measures of success in university. They found that need for cognition was positively related to GPA and satisfaction with one's studies, and negatively to termination thoughts (considering to quit studies) and suggested that research on need for cognition in postsecondary education would be intensified.

Academic interest (Chapters 4, 5, and 7)

The learning content in university differs from that in secondary school. One important distinction is the focus on research, which is quite prominent in Dutch research universities. In order for new university students to be satisfied with the new learning environment it is important that they are interested in gaining abstract, in-depth, inquiry-based knowledge – they must be drawn to this kind of knowledge – and that they are excited about designing and conducting research. This interest, to which we refer as 'academic interest', may then also be an important part of university readiness. In this thesis, we define academic interest as individual interest in gaining academic knowledge in a chosen field and its research-based activities – in contrast to situational interest, which refers to temporary interest aroused by a certain situation. This definition aligns with Hidi and Renninger's (2006, p. 112) conceptualisation of interest as a motivational variable that "refers to the psychological state of engaging or the predisposition to reengage with particular classes of objects, events, or ideas over time". Or, put more simply by Schunk, Pintrich, and Meece (2008, p. 210): "people's liking and willful engagement in an activity". No research has specifically looked into academic interest in general nor into its relationship with university readiness or success in university education, but studies on closely related constructs provide some useful starting points on which we have built our hypotheses. Most importantly, research showed that interest in a specific subject or course is a powerful predictor of learning outcomes in that same subject or course (Ainley, Hidi, & Berndorff, 2002; Singh, Granville, & Dika, 2002). Additionally, links have been found between interest and academic self-efficacy (Chen et al., 2016). As our conception of academic interest is closely related to intrinsic motivation, i.e., performing a specific behaviour or activity for its inherent satisfaction rather than for a specific reward or consequence (Ryan & Deci, 2000), we were interested in finding out whether academic motivation would have the same effects as intrinsic motivation, which is related to achievement (Richardson et al., 2012; Robbins et al., 2004) and to adjustment to university (Lynch, 2009; Petersen et al., 2009).

Academic self-efficacy (Chapters 3, 4, 5, and 7)

Self-efficacy in general refers to an individual's perception of his or her ability to perform adequately in a given situation (Bandura, 1997). Academic self-efficacy then relates to self-efficacy in academic settings. Academic self-efficacy has consistently been found to relate to favourable outcomes in postsecondary

education: According to international review studies, it is related to both achievement and retention (e.g., Honicke & Broadbent, 2016; Richardson et al., 2012; Robbins et al., 2004). In this thesis we take a narrower view of academic self-efficacy by focusing specifically on academic self-efficacy in the university setting. This is defined as the student's belief that he or she can perform well in university-specific tasks, such as mastering the content of academic textbooks for a test and writing an essay that answers a research question. Following research on academic self-efficacy, we believe self-efficacy could be an important part of university readiness, as it is likely that students who are confident that they can handle the learning tasks they have to perform in university will perform better in university than those who lack this confidence. Moreover, besides the established effect of academic self-efficacy on achievement, research has found additional favourable outcomes of high self-efficacy, such as being able to cope more effectively with challenges; showing more perseverance; having higher motivation; experiencing less stress in difficult situations; and being better at self-regulated learning (Bassi, Steca, & Delle Fave, 2010; Bong, 1997; Caraway, Tucker, Reinke, & Hall, 2003; Chemers, Hu, & Garcia, 2001; Geitz, Joosten-Ten Brinke, & Kirschner, 2016). These are all outcomes that could also be beneficial during the transition from secondary education to university. Last but not least, Chemers, Hu, and Garcia (2001) reported that self-efficacy was related to adjustment in the first year of postsecondary education. Hence, self-efficacy may play a crucial role in the transition and may be perceived as a pivotal aspect of university readiness.

Learning strategies: surface, deep, metacognitive, and self-regulated learning (Chapters 3, 5, and 7)

Cognitive strategies, such as surface and deep learning, describe how students learn. Metacognitive strategies and self-regulated learning describe how students manage their learning. Particularly the need for appropriate metacognitive strategies and self-regulated learning skills becomes apparent when we consider the difference between how learning is regulated in secondary school and in university. Whereas in the former setting students can still rely on their teachers for external regulation, they have to depend on themselves and regulate their own learning in the latter. One might say that being ready for university in this sense equals being able to effectively use self-regulated and metacognitive learning strategies. International reviews showed that these strategies are related to success in postsecondary education (Credé & Phillips, 2011; Richardson et al., 2012;

Robbins et al., 2004). Furthermore, although it is often claimed that in university deep learning, e.g., critical and analytical thinking, should prevail over surface learning, e.g., rote memorisation, both types are required (Beattie, Collins, & McInnes, 2010). Writing essays, for example, calls for deep learning strategies, whereas completing multiple choice exams involves, depending on the learning content, at least a certain amount of surface learning skills such as memorising. Research has found mixed results regarding the relationship between deep and surface learning and achievement. In some studies, no relationships were found; others, however, showed positive outcomes for deep learning (e.g., Furnham, Monsen, & Ahmetoglu, 2009), and/or negative results for surface learning (e.g., Richardson et al., 2012). Students who did not need to put much effort into their schoolwork in secondary education may have not developed sufficient cognitive and metacognitive strategies, which may cause them to struggle in university. Although research is not conclusive about the effect of the relationship between deep and surface learning on achievement in university, we still take into account all four cognitive and metacognitive strategies in this thesis in order to find out how they relate to student's university readiness and success.

Student engagement (Chapters 4 and 5)

For success in education it seems a basic condition that a student is actively engaged, both physically (e.g., attending class) and mentally (e.g., concentrating and paying attention). Over the last decades, the concept of student engagement – i.e., involvement in and commitment to school (Landis & Reschly, 2013) – has gained substantial momentum in educational research on all levels – from primary up to higher education. Engagement is often divided into three elements: behavioural engagement, cognitive engagement, and affective (or emotional or psychological) engagement (Fredricks, Blumenfeld, & Paris, 2004). Behavioural engagement concerns the most visible part of engagement, as it consists of observable indicators like positive conduct, attendance, time on task, active participation (e.g., asking questions), and preparation (e.g., studying for tests and completing assignments) (Christenson, Stout, & Pohl, 2012; Fredricks, Blumenfeld, & Paris, 2004). Cognitive engagement can be described as the quality of a student's mental effort that is directed toward learning (Newmann, Wehlage, & Lamborn, 1992), e.g., when making an assignment, is the student consciously trying to tackle a specific problem or just thoughtlessly copying some sentences from the textbook? The metacognitive and cognitive strategies discussed in the previous

paragraph can be perceived as aspects of cognitive engagement (Fredricks et al., 2004). Affective engagement relates to a sense of belonging (Landis & Reschly, 2013) and is often measured by looking at a student's perceptions of his or her relationships with teachers and peers. Affective engagement will not be discussed in this thesis, but in Chapter 5 we do add another aspect of engagement, namely intellectual engagement. Intellectual engagement is defined as an individual's attraction to tasks that are intellectually demanding (Ackerman, Kanfer, & Goff, 1995). For students studying at the highest level, and who will likely take on essential positions in academia and society later in life, this seems to be a relevant type of engagement. Need for cognition and academic interest can be seen as part of it. Research has shown positive relationships between engagement factors and achievement (Klem & Connell, 2004) and self-efficacy (Linnenbrink & Pintrich, 2003). Here, we ask the question if engagement contributes to university readiness, and if so, which engagement types matter the most.

Out-of-school academic activities (Chapter 4)

Students may be high in need for cognition and academic interest, but does this also translate to the corresponding behaviour? This can be captured by measuring students' out-of-school academic activities, i.e., informal academic activities they pursue on their own initiative in their spare time. These activities may involve reading about research in the newspaper or on websites, talking to friends and family about academic knowledge, or watching research-based documentaries. Secondary school students who already do this, even though no one requires them to do so, may be particularly suitable for university, as they already actively seek for the university-type of knowledge. PISA studies have investigated science-related out-of-school academic activities. Their 2006 results showed that, worldwide, not many secondary school students were engaged in out-of-school science activities: The highest percentages of engaged students were around 20%, for the items "Watch TV programmes about science" and "Read science magazines or science articles in newspapers" (OECD, 2007). Students who visited websites or read books about science topics were rare. The PISA 2015 survey asked parents how often their children were engaged in science-related activities when they were ten years old. Again, watching science programmes on TV was the most popular activity, engaged in by 22% (OECD, 2017). Said PISA results showed that students engaging in science-related activities at age ten were about 1.7 times as likely to enjoy science and 1.6 times as likely to have high science self-efficacy at

age 15 compared to students who did not (OECD, 2017). Consequently, it can be argued that students who often engage in out-of-school academic activities during primary and secondary education are more interested and more self-efficacious in studying at university, because in university they will likely study the topics that they now engage in on their own initiative. Moreover, by doing so, students already familiarise themselves with the world of research and specific academic topics, which may make the transition from secondary school to university, as well as choosing a degree programme, easier. Out-of-school academic activities may serve as another indicator of students' readiness for university studies in that respect.

Satisfaction with the chosen programme (Chapters 3 and 7)

So far, we have written about university readiness in a general sense only, but in reality, a student needs to be ready for a specific degree programme, since in the Netherlands, students who enter university have to choose their major before they start their studies. Readiness in terms of content knowledge should be more or less guaranteed by the specific coursework that certain degree programmes require, e.g., starting a physics degree at university requires having completed advanced mathematics and physics in secondary school. Readiness regarding behavioural and motivational factors has been discussed above. An important issue that remains, however, is making the 'right' choice: Of all available degree programmes, how does a student choose the one that suits his or her talents, interests, and values best? Choosing a programme is a high stakes choice, as it (partly) determines which careers will be (easily) accessible to a student later in life. Besides, choosing wrongly can be costly, financially, but also time-wise (a student is very likely to lose a year by switching programmes), and emotionally (quitting a programme may feel like failing). So, there is a lot of pressure to make a good choice, but this can be very hard for adolescents. An important step in choosing is self-orientation (Germeijs & Verschueren, 2007), meaning that students have to find out where their talents lie, what they really like, and what kind of values they have. For many young people, having this self-insight is not as easy as it may seem. Then, it is vital that students familiarise themselves with degree programmes that might suit them. This can be challenging, also since universities tend to use marketing approaches to 'advertise' their programmes (Hemsley-Brown & Oplatka, 2006). Especially when students have limited knowledge about a programme, the information provided by the institution could be the only source of information

and students may be susceptible to programmes that are 'branded' in an attractive way (Chapleo, 2011), e.g., a brochure that focuses on the most interesting courses, includes interviews with the most satisfied students, and presents the job prospects framed in the most positive way possible. Research corroborates that there is a gap between the documents provided for prospective students and important factors students base their choice on: Often there are not sufficient details about the academic and practical aspects of the programme (Hemsley-Brown & Oplatka, 2006), which puts students at risk of making an uninformed choice (Mortimer, 1997). So how do students know if what they see and read about a programme is a good representation of the actual programme they will be studying? This is especially problematic in the case of completely new subject matter, so when the degree programme is not part of or related to any secondary school subject. Examples are degree programmes in cultural anthropology, pedagogical sciences, and law. Both the topic and the learning environment will be new, which could make it even more difficult to form realistic expectations about studying at university. Once in university, if the expectations do not meet reality, a student may be disappointed and consider to quit or underachieve due to a lack of intrinsic motivation. Research confirms that satisfaction with the degree programme is related to retention and achievement (Suhre et al., 2007; Yorke & Longden, 2007) and that dissatisfaction is an important reason for dropout (De Buck, 2009; Wartenbergh & Van den Broek, 2008). Likewise, it can be expected that students who are satisfied with the programme they have chosen find it easier to adjust academically to the new learning environment at university.

1.6 Main aim and research questions

The overarching goal of this thesis is to gain more insight into the transition from secondary education to university, in order to improve this transition, reduce dropout as well as study delays, and increase achievement in university. The following two research questions are central:

1. What student characteristics contribute to effectively bridging the gap between secondary and university education and to success in the first year at university?
2. What role do secondary school teachers currently play in preparing students for university?

Based on the answers to these questions we will make some recommendations for secondary schools that could improve the transition between secondary and university education.

1.7 Overview of the chapters

This thesis consists of five studies, which are briefly described below. Figure 1.2 shows whether the studies were conducted in secondary education, in university, or in both. Table 1.1 at the end of this Introduction presents an overview of all studies, including their research questions, sample, method, and the independent and dependent variables of interest.

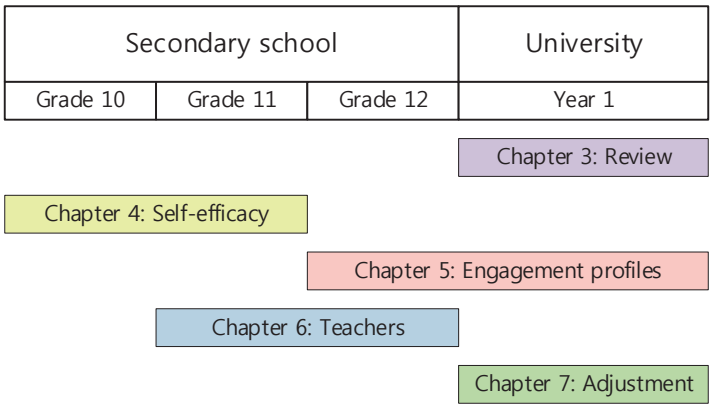

Figure 1.2 Overview of where the five studies were conducted

1.7.1 Chapter 3: A systematic review of factors related to first-year students' success in higher education

As pointed out above, there is not much research that specifically focuses on the transition from secondary to postsecondary education, which is why the starting point for this research was to look at what factors influence first year students' success in postsecondary education. However, although there are some important international reviews on student success factors (e.g., Robbins et al. (2004) and Richardson et al. (2012)), these results may not necessarily transfer to the context in the Netherlands. Furthermore, these reviews focused on undergraduate education, not specifically on first-year students, who make up the population of interest when investigating the transition. In addition, many studies look at one or

two outcomes of success, whereas there are three outcomes that are worth looking at: grade point average, number of obtained credits, and continuing into the second year. So far, an overview of factors that influence students' success in Dutch and Flemish higher education has not yet been available and findings of individual studies were scattered, e.g., researchers had investigated many different types of factors, focused on different populations, and used different outcome measures. We have tried to address these shortcomings and conducted a systematic review study in association with two colleagues in Antwerp. The aim was to obtain a comprehensive overview of factors that are important in explaining grade point average (GPA), number of obtained credits (EC), and persistence in the first year of higher education (i.e., professional education and university education) in the Netherlands and Flanders. We searched several databases and screened more than 100 peer-reviewed papers on student success that were published after 2000. In the end, 38 papers met our inclusion criteria. The findings from these individual studies were sorted into nine categories: 1) ability; 2) demographic factors; 3) prior education; 4) personality; 5) motivation; 6) the learning environment; 7) psychosocial factors; 8) learning strategies; and 9) engagement. Consequently, each category contained information on whether or not and how its variables were related to GPA, EC, and/or persistence, which we describe in the results. Also, we discuss differences between the Netherlands and Flanders and between professional and university education, and suggest directions for further research and ideas to advance the field of higher education research in these two Dutch-speaking countries. This overview of factors that influence a successful first year provided the starting point for the other studies in this thesis: By knowing what makes students thrive in university we have better ideas of what may be important factors of university readiness.

1.7.2 Chapter 4: Factors that contribute to secondary school students' self-efficacy in being a successful university student

International and Dutch research showed that academic self-efficacy is an important predictor of first-year university students' success. This makes it a key intended outcome of pre-university education, not only due to its proven connection with achievement and retention in higher education, but also because academic self-efficacy has been linked to characteristics that are beneficial when experiencing a transition, e.g., coping strategies and stress management. It can thus be expected that students with high levels of self-efficacy at the end of

secondary school experience a better transition to university. In this study we investigated what factors were related to grade 10 and 11 students' self-efficacy in being a successful university student. Gaining more insight into these factors could lead to guidelines for teachers on how to improve their students' self-efficacy. Factors taken into account were the personality variable need for cognition, the motivational variable academic interest, and two engagement variables: behavioural engagement and out-of-school academic activities. As background variables, we included gender, coursework, and level of parental education in the path model of hypothesised relationships between the factors and self-efficacy. The model was tested with structural equation modelling in Mplus and the results led to increased insight into what factors contribute to upper grade secondary school students' self-efficacy in being successful in university.

1.7.3 Chapter 5: The relationship between secondary school students' engagement profiles and the transition to university

Engagement factors are consistently related to success in higher education (e.g., De Koning, Loyens, Rikers, Smeets, & Van der Molen, 2012; Jansen & Suhre, 2010). In this study we were interested in whether different groups of secondary school students could be identified based on different types and levels of engagement. Moreover, we wanted to investigate whether these engagement profiles would be related to students' achievement and adjustment in university. That is why, in this study, we linked data collected in the last grade of secondary school to data collected one year later in the same students after they had made the transition to university. Three different types of engagement measured in grade 12 formed the basis of the creation of the profiles: behavioural engagement, cognitive engagement, and intellectual engagement. Behavioural engagement concerned basic effort and included the factors behavioural engagement (e.g., actively participating in class) and self-efficacy: effort (e.g., being confident that as a university student you will be able to spread your studying activities over a longer time instead of cramming the last few days before an exam). Cognitive engagement referred to putting in mental effort and related to the quality of engagement with learning. Four learning strategies were used to capture cognitive engagement: surface learning, deep learning, metacognitive learning, and self-regulated learning. Last, intellectual engagement revolved around students' engagement in intellectual activities and was measured by need for cognition (comparable to being curious), academic interest (e.g., being interested in research activities and research findings), and

self-efficacy: understanding (e.g., being confident that you can understand university-level content). Based on these nine indicator factors we applied latent profile analysis to test what the optimal number of groups was. Five groups were identified in the data. A year later, after having collected data of part of the grade 12 participants after they had entered university, we compared these five groups on academic adjustment and academic achievement (GPA and EC). The meaningful differences we found are discussed in this study. This study represents important knowledge, since not much research has linked student characteristics in secondary school to university outcomes. Furthermore, with this information about students, teachers could specifically address certain factors that contribute to university readiness.

1.7.4 Chapter 6: Secondary school teachers' beliefs and practices regarding university preparation

After having found out more about factors that contribute to a successful transition to university in the previous three studies, a question that kept lingering was whether teachers in pre-university education were actually paying attention to preparing students for university. Previous research showed that perceived study skills preparation in secondary school concerning time management and learning skills had a positive effect on university students' study behaviour (Jansen & Suhre, 2010) and that students found their secondary school teachers helpful as to preparation for postsecondary education (Reid & Moore, 2008; Smith & Zhang, 2008). Moreover, the vast majority of teachers in pre-university education have attended university themselves, so they should have a clear image of what studying at university is like, which would help students form realistic expectations. But what attitudes, characteristics, skills, and knowledge do teachers believe students need in order to be ready for university? Do they explicitly deal with trying to develop these characteristics in their students? If they do, then how do they do this? Do they believe that this is part of their job? Are there any barriers that hinder them in preparing their students for university? In this study, we sought to answer these questions and painted a picture of teachers' beliefs and practices regarding university preparation. Fifty teachers in the upper grades of pre-university students were interviewed. Transcripts of the interviews were systematically analysed by means of framework analysis. The framework we used to categorise teachers' beliefs on university readiness attributes and university preparation practices was the four-key model of college readiness developed by Conley (2008). This resulted

in a view of which keys to university readiness teachers found most important and if these were also the ones that teachers dealt with in the classroom. We also obtained insight into teachers' points of view regarding their role in university preparation, into commonly experienced barriers, and into wishes they had in order to improve students' university readiness. The findings are discussed, with a focus on the barriers and how these could be lifted in order to better prepare students for university.

1.7.5 Chapter 7: Academic adjustment as a pivotal process in the transition from secondary education to university

This thesis revolves around the transition, but how important is this transition for explaining students' success in the first year of university? In this last study we investigated how great the impact of the experience of the transition was on students' first year GPA, EC, and intention to persist into the second year. As a measure of how well the transition went we used academic adjustment, i.e., the extent to which the student is able to cope with the academic demands of the new learning environment. Previous research has already shown that academic adjustment is related to success, but we specifically wanted to know how great its impact was on the three different measures of success. Moreover, we wanted to gain insight into the factors that affect academic adjustment. Factors of interest were secondary school GPA, academic motivation, academic self-efficacy, self-regulated learning, and satisfaction with the chosen degree programme, all of which were relevant in previous research. The hypothesised model consisted of links between these factors and the success outcomes, as well as links between these factors and academic adjustment, and between academic adjustment and the outcomes. Structural equation modelling in Mplus revealed a well-fitted model that showed which factors mattered and which did not, and how great the impact of academic adjustment was on GPA, EC, and intention to persist. The unexpected absence of a certain link is discussed, as well as the importance of several other factors. This study provides us with some useful directions for future research and ideas on how to improve the transition from secondary education to university.

1.7.6 Reading guide

Before these five studies are presented in Chapters 3 to 7, Chapter 2 will give an overview of the methods used in these studies, with specific focus on how the

constructs have been measured. Because new instruments have been developed to measure some of the constructs, it is important to provide detailed information about the process of developing these instruments, such as the reasons for item selection and item removal as well as explanations as to why certain constructs were measured in different ways in different studies. In Chapter 8, the two main research questions will be answered and the major conclusions will be presented. Here, we will also discuss the findings, point out some limitations of the current research as well as directions for future research, and provide implications for practice in secondary education. Finally, Appendix I contains a summary of this thesis in Dutch, Appendix II presents all questionnaires (in Dutch) that have been used in the three quantitative studies with student samples (Chapters 4, 5, and 7), and Appendix III shows the interview protocol that has been used in the qualitative study with a teacher sample (Chapter 6). An important note is that, since this thesis consists of a collection of papers that can be read independently, there may be some overlap between Chapters 3 to 7.

Table 1.1 Overview of the chapters: Research questions, sample descriptions, methods, independent factors, and dependent factors

Chapter number and title	Research questions	Sample description	Method	Independent factors	Dependent factors
3. A systematic review of factors related to first-year students' success in higher education	1. Which factors are important correlates of first-year student success in higher education in the Netherlands and Flanders? 2. Are there any notable differences between the Netherlands and Flanders; between professional education and university education; and based on the outcome variable (GPA, EC, or persistence)?	38 Dutch and Flemish peer-reviewed articles which investigated first-year higher education students' success	Systematic review	- Ability - Demographic factors - Prior education - Personality - Motivation - Learning environment - Psychosocial factors - Learning strategies - Engagement	- First-year university GPA - Number of attained credits - Persistence into the second year
4. Factors that contribute to secondary school students' self-efficacy in being a successful university student	1. What is the relative importance of need for cognition, academic interest, behavioural engagement, and out-of-school academic activities in terms of influencing students' self-efficacy for being a successful university student? 2. How much influence is exerted by background variables, including gender, level of parental education, and taking science or humanities/social sciences coursework in secondary school?	759 grade 10 and 11 students from 5 schools	Structural equation modelling: path analysis	- Gender - Parental education - Coursework - Need for cognition - Academic interest - Out-of-school academic activities - Behavioural engagement	Academic self-efficacy
5. The relationship between secondary school students' engagement profiles and the transition to university	1. Which student profiles emerge in the last grade of secondary school from the indicators of behavioural, cognitive, and intellectual engagement? 2. How do these groups differ one year later in their academic adjustment and achievement in university?	669 grade 12 students from 11 schools, including 90 students who also participated one year later in university	Latent profile analysis; ANCOVA	- Behavioural engagement: behavioural engagement and self-efficacy: effort - Cognitive engagement: surface learning, deep learning, metacognitive learning, self-regulated learning - Intellectual engagement: need for cognition and academic interest	- First-year university GPA - Number of attained credits - Academic adjustment

Table 1.1 (continued) Overview of the chapters: Research questions, sample descriptions, methods, independent factors, and dependent factors

Chapter number and title	Research questions	Sample description	Method	Independent factors	Dependent factors
6. Secondary school teachers' beliefs and practices regarding university preparation	1. What are teachers' beliefs about aspects of university readiness? 2. How do teachers contribute to their students' university readiness? 3. What are teachers' beliefs about their role in the process of preparing students for university? 4. Do teachers experience barriers that hinder them from attending to university preparation, and if so, what are these barriers, and how might they be overcome?	50 teachers teaching the upper grades of secondary education	Framework analysis	NA	NA
7. Academic adjustment as a pivotal process in the transition from secondary education to university	1. Which motivational and behavioural variables measured in the first year of university affect students' academic adjustment and success? 2. Do they affect student success directly or through academic adjustment? 3. What is the magnitude of the influence of academic adjustment on academic success?	243 first-year university students from several degree programmes and universities	Structural equation modelling: path analysis	- Secondary school GPA - Academic self-efficacy - Academic motivation - Self-regulated learning - Degree programme satisfaction - Academic adjustment	- First-year university GPA - Number of attained credits - Intention to persist to the second year

CHAPTER 2

Method

In this chapter we will describe the samples, procedures, instruments, and analyses that were used in the four empirical studies that are presented in Chapters 4 to 7.

2.1 Participants and procedures

2.1.1 Students

Table 2.1 presents the sample characteristics of the four studies and Figure 2.1 shows the timeline of the data collection. The data for Chapters 4 and 5 were collected in secondary schools. Chapter 4 was intended as a pilot study for the large-scale secondary school data collection of Chapter 5. Participants were grade 10 and 11 students from five schools in the north of the Netherlands. These data were collected in June 2013. However, the instruments tested in this pilot proved to be of sufficient quality for statistical analyses, which is why these pilot data could be used for Chapter 4. After refining the instruments based on the Chapter 4 pilot data results, we collected data on a larger scale from November 2014 to February 2015, at 15 schools all over the Netherlands in grades 10, 11, and 12. The total number of participants was 2,261, but for Chapter 5 we only used the data from grade 12 students (n = 669, from N = 11 schools). The procedures of the pilot study and the large-scale study were comparable: Students completed paper-and-pencil questionnaires in a classroom, after having received instruction from either the researcher or a teacher who was instructed by the researcher.

At the end of the secondary school questionnaires for Chapter 5, we asked the participating grade 12 students if they were willing to provide us with their e-mail address so that we could contact them a year later for a follow-up study. In total, 90 students who participated in the data collection for Chapter 5 also completed an online questionnaire one year later when they were studying at a university. For these students we could then analyse how certain characteristics measured in secondary school were related to success in university a year later. These analyses were part of Chapter 5.

Next to the data from these 90 first-year university students we also collected data at our own university in three degree programmes: human geography and urban and regional planning, law, and sociology. These students completed the same online questionnaire as the students who we managed to follow from grade 12 to university. This resulted in a sample of 243 first-year university students that was used for Chapter 7. Data collection for Chapter 7 took place from December

2015 to January 2016. In this sample, females were overrepresented, as the above-mentioned degree programmes are more popular among women.

2.1.2 Teachers

Chapter 6 was a qualitative study that focused on secondary school teachers. A total number of 50 teachers were interviewed in the last four months of 2015 and in February, March, and April 2016. This was a sample of convenience, as many teachers were employed at the schools where we already had collected the student data.

Table 2.1 Sample characteristics

Chapter	n	*N* secondary schools / university programmes	Grade secondary school or year university	% male	% science coursework in secondary school	GPA secondary school	GPA first year university
4	759	5 schools	10 & 11	49.5	54.9	6.85	NA
5	669	11 schools	12	57.4	57.4	6.68	NA
	90	several university programmes	Year 1 university	39.9	65.1	6.81	7.17
6	50	14 schools	teaching grade 12	48	34% science teachers	NA	NA
7	243	several university programmes	Year 1 university	32.3	32.3	7.07	6.90

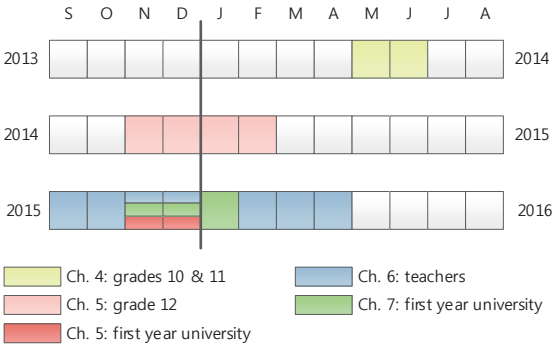

Figure 2.1 Timeline of data collection per school year (September – August)

2.2 Instruments

We used several existing instruments to measure the constructs of interest and developed new questionnaires. Because our systematic review (Chapter 3) showed

the importance of providing clear and complete information about questionnaires used in research we will describe below how the constructs used in this thesis were measured and why in some chapters we used only specific parts of a construct. Definitions and descriptions of the concepts, as well as what previous research has already told us about their relationship with academic success outcomes, can be found in the Introduction and in the separate chapters. Table 2.2 shows which constructs we used in which studies and some basic measurement information (number of items, scale, and Cronbach's alpha). In addition, we added the means and standard deviations found in each sample.

When we used existing instruments or items, these were translated from English to Dutch using the back-translation procedure, with the help of a near-native speaker. All questionnaires used in this thesis can be found in Appendix I (in Dutch).

Table 2.2 Measurement information of all constructs used in this thesis

Construct per study	Number of items	Scale	Cron-bach's alpha	Mean	SD
Need for cognition; Chapter 4	18	1-5	.83	3.42	.48
Need for cognition; Chapter 5	18	1-5	.86	3.55	.48
Academic interest; Chapter 4	6	1-4	.87	2.89	.68
Academic interest; Chapter 5	17	1-5	.92	3.56	.70
Academic motivation; Chapter 7	13	1-5	.88	3.46	.59
Behavioural engagement; Chapter 4	8	1-5	.87	3.60	.78
Behavioural engagement; Chapter 5	8	1-5	.86	3.66	.73
Out-of-school academic activities; Chapter 4	6	1-5	.77	2.26	.73
Academic self-efficacy; Chapter 4	6	1-4	.70	2.58	.48
Academic self-efficacy; Chapter 7	16	1-5	.74	3.64	.42
Academic self-efficacy: understanding; Chapter 5	8	1-5	.85	3.82	.49
Academic self-efficacy: effort; Chapter 5	4	1-5	.73	3.73	.70
Surface learning; Chapter 5	4	1-7	.60	4.60	.97
Deep learning; Chapter 5	15	1-7	.80	4.48	.72
Metacognitive learning; Chapter 5	12	1-7	.71	4.82	.68
Self-regulated learning; Chapter 5	12	1-7	.76	4.57	.76
Self-regulated learning; Chapter 7	12	1-7	.87	5.09	.96
Academic adjustment; Chapter 5	24	1-5	.86	3.69	.43
Academic adjustment; Chapter 7	24	1-5	.85	3.65	.45
Academic adjustment: motivation; Chapter 5	6	1-5	.71	4.07	.51
Academic adjustment: application; Chapter 5	4	1-5	.70	3.52	.85
Academic adjustment: performance; Chapter 5	9	1-5	.73	3.34	.54
Academic adjustment: environment; Chapter 5	5	1-5	.81	3.96	.54
Degree programme satisfaction; Chapter 7	2	1-5	.80	4.39	.81

2.2.1 Need for cognition

Need for cognition was measured in Chapters 4 and 5 with the efficient version of the Need for Cognition Scale (NCS) developed by Cacioppo, Petty, and Kao (1984). In both studies, alphas were above .80.

2.2.2 Academic interest

Academic interest is a construct that we used in three studies (Chapters 4, 5, and 7). In all three studies, the scale was different, which is due to further improvement of the scale and due to sample differences (secondary school students in Chapters 4 and 5, and university students in Chapter 7). In this paragraph we will elaborate on this.

For the pilot study, Chapter 4, we developed six items to measure academic interest that had good face value and proved to be consistent – and understandable for students – in a small-scale pilot test that we did before we started the Chapter 4 data collection. These items measured the extent to which students were interested in gaining academic knowledge and in doing research. In the data collection for Chapter 4, these items had a good internal consistency.

Before starting the data collection of Chapter 5, we found two existing questionnaires that had some items that tapped into academic interest: the Scientific Attitude Inventory II (SAI II) by Moore and Foy (1997) and the Modified Attitudes Toward Science Inventory (MATSI) by Weinburgh and Steele (2000). Items of these questionnaires matched the academic interest construct we intended to measure and were related to the six items we had already developed, hence we added some of them to our scale. From the SAI II we used eight items about liking and disliking gaining new knowledge and doing research (e.g., "The search for scientific knowledge would be boring") and from the MATSI we used three items that tapped into science-related anxiety (e.g., "It makes me nervous to even think about doing science"). This resulted in a total of 17 items that measured academic interest in Chapter 5, which had an internal consistency of .92. Another change compared to Chapter 4 was that in the questionnaire for Chapter 5 we changed the scale range of academic interest from 4 to 5. Reasons were that we did not want to force students to choose an option when they were really neutral towards the statement and that we wanted to make the questionnaire more consistent – most other factors were also measured on a 5-point Likert scale.

In contrast to the studies in Chapters 4 and 5, which had secondary school students as sample, the study in Chapter 7 took place in the first year of university.

Hence, some academic interest items that were suitable in secondary school were not appropriate anymore, e.g., "I look forward to studying at university" and "I am curious about what kind of academic things you could do in the field I'm interested in". For this reason, four items were dropped. All items that were used to measure academic interest in the three studies are displayed in the Appendix. In Chapter 7, academic interest is referred to as academic motivation.

An important note should be made here regarding the terminology in Dutch and in English. Whereas we draw from two instruments that focus on attitudes toward science, our interest was in students' attitudes toward the academic way of thinking and academic activities (e.g., studying and doing research) in general, regardless of the field. As such, in this thesis we were not interested in whether students are drawn to science, social science, or humanities, but the extent to which they were interested in the inquiry-based way of thinking, in gaining knowledge, in studying things in depth, and in doing research – regardless the field or topic of study. As a consequence, when using items from these existing questionnaires, we translated 'science' into 'wetenschappelijk'. In Dutch, the word 'wetenschap' is a general word denoting all academic fields, the academic way of thinking, and doing research. As such, is does not refer exclusively to science – science is translated as 'natuurwetenschappen' in Dutch. Throughout the thesis we will use 'academic interest' to refer to 'wetenschappelijke interesse'.

2.2.3 Behavioural engagement

In Chapters 4 and 5 we used a measure of behavioural engagement. This measure was part of a larger questionnaire that mapped more components of engagement. This was also a questionnaire that we developed ourselves, although in this case we strongly drew from existing instruments. The reason to construct a new questionnaire was that all existing ones had some items that we deemed unsuitable for the situation of Dutch secondary schools. An example were items that focused on involvement in school activities such as clubs and sports – in the Netherlands, students usually do these things at external organisations instead of at school.

Our questionnaire measured two main components of student engagement: behavioural and affective engagement. The items were taken from the Student Engagement Instrument (Appleton, Christenson, Kim, & Reschly, 2006), the Student Engagement in Schools Questionnaire (Hart, Stewart, and Jimerson, 2011), the Engagement versus Disaffection with Learning (Skinner, Furrer, Marchand, & Kindermann, 2008), and the Identification With School Questionnaire (Voelkl,

1996). The first version of our questionnaire consisted of 32 items. In the study for Chapter 4 we tested that questionnaire. An exploratory factor analysis revealed four factors that we described as follows: behavioural engagement (8 items); affective engagement: liking school (5 items); affective engagement: valuing school (6 items); and commitment (4 items). Reliabilities were around or above .80 (behavioural engagement: α = .87; affective engagement: valuing school: α = .80; commitment: α = .78), except for affective engagement: liking school (α = .69). In Chapter 4, we chose to only use behavioural engagement, as the literature showed that this type of engagement was most strongly related to educational outcomes.

In Chapter 5, only the 23 items were used that survived the pilot test and were thus linked to one of the four factors of engagement that were found in the study for Chapter 4. Reliabilities of all engagement factors were sufficient (behavioural engagement: α = .86; affective engagement: liking school: α = .74; affective engagement: valuing school: α = .79; commitment: α = .73), but again only behavioural engagement was used in the study.

2.2.4 Out-of-school academic activities

To measure out-of-school academic activities (Chapter 4) we used four items from the index of science-related activities used in PISA (OECD, 2007, p. 154) and added two new items. The items were academic activities such as reading about research results in books or on the internet. Students had to indicate how often they did these activities in their spare time. As with measuring academic interest, these activities could refer to all academic fields and not only to the natural sciences. We made this explicit in the questionnaire by giving examples related to both the natural and the social sciences. Reliability was sufficient.

2.2.5 Self-efficacy

For Chapter 4, we developed 15 items to measure students' self-efficacy in studying at university. These items were inspired by the eight items of the index of self-efficacy in science from PISA (OECD 2007, p. 135), e.g., "Recognise the science question that underlies a newspaper report on a health issue" and "Discuss how new evidence can lead you to change your understanding about the possibility of life on Mars". Again, we rephrased the items to make sure all academic fields were covered. Items were measured on a 4-point Likert scale, where students had to indicate how well they thought they could perform the described task. We added items that were directly related to studying at university, e.g., "Studying three

books thoroughly for a test" and "Writing an essay on an academic subject in your own field of interest, based on research evidence". Results of an exploratory factor analysis revealed that six of these 15 items formed one scale. That scale had an alpha of .70.

For Chapter 5, we used an existing scale of academic self-efficacy specifically for higher education, the College Academic Self-Efficacy Scale (CASES; Owen & Froman, 1988), that we came across after the data for Chapter 4 had already been collected. This scale matched nicely with what we intended to measure. We used 29 of the 33 CASES items. Two items were eliminated because they overlapped with other items (e.g., "Tutoring another student" was very similar to "Explaining a concept to another student") and two items because we felt they were not very relevant (e.g., "Talking to a professor privately to get to know him or her"). Items related to social skills that are needed in university were missing, so we added the following two statements: "Collaborating with other students on an assignment for class" and "Making new friends at university". Students had to indicate on a 5-point Likert-scale how confident they were that they could perform these tasks successfully. Exploratory factor analysis showed that three separate constructs could be measured with 16 of the items: self-efficacy in understanding university-level content (8 items), self-efficacy in putting in the necessary amount of effort needed to be a successful student (4 items), and self-efficacy regarding typical social skills needed in university (4 items). Social self-efficacy had a low alpha (.66), so we did not use that factor in the analyses for Chapter 5. The total self-efficacy scale had an alpha of .80.

These 16 items of academic self-efficacy were used again in Chapter 7, where we measured first-year university students' self-efficacy. Here we only used the total scale, which had an alpha of .72.

2.2.6 Learning strategies

For the study in Chapter 5 we measured four learning strategies: surface learning, deep learning, metacognitive learning, and self-regulated learning. All were measured by items from the Motivated Strategies for Learning Questionnaire, part B (MSLQ; Pintrich, Smith, Garcia, & MCKeachie, 1991). The four learning strategies were formed from the following MSLQ subscales:

- Surface learning (4 items): rehearsal.
- Deep learning (15 items): elaboration, organisation, and critical thinking.

- Metacognitive learning (12 items): metacognitive self-regulation.
- Self-regulated learning (12 items): time and study environmental management and effort regulation.

The MSLQ subscales peer learning and help seeking were not used. In addition to translation to Dutch (via the back-translation procedure by a near-native speaker), some minor modifications had been made to the MSLQ items: we made sure all items were referring to students' general habits of studying, regardless of the subject or course. The reason for this is that we were interested in students' use of learning strategies in general, not in a specific course. All items were measured on a 7-point Likert scale, where students had to indicate the extent to which the item was applicable to their way of learning. Reliabilities of three of the four learning strategies were sufficient ($\alpha > .70$), but in the case of surface learning borderline ($\alpha = .60$).

In Chapter 7 we only used self-regulated learning.

2.2.7 Academic adjustment

Academic adjustment was measured in the studies in Chapters 5 and 7 with the academic adjustment subscale of the Student Adjustment to College Questionnaire (SACQ; Baker & Siryk, 1989). In Chapter 5 all four subscales were used; in Chapter 7 only the total academic adjustment scale. The total scale consists of 24 items. The four subscales are: motivation (6 items), application (4 items), performance (9 items), and environment (5 items). Items were measured on a 5-point Likert scale. Reliabilities were all sufficient.

2.2.8 Satisfaction with the chosen degree programme

In the study for Chapter 7 we measured students' satisfaction with the degree programme they had chosen and started. Two items were used: "I am satisfied with the programme I chose" and "Looking back, I wish I had chosen a different degree programme" (reverse coded). Cronbach's alpha was .80.

2.3 Analyses

2.3.1 Structural equation modelling

Structural equation modelling with Mplus has been used in Chapters 4 and 7. In both studies, structural models, with expected relationships between the latent

factors, were built and tested. In Chapter 4, the aim was to uncover which factors were related to the outcome factor academic self-efficacy. Background factors in the model were gender, coursework (science or social sciences and humanities), and level of parental education. Other factors expected to be related to self-efficacy were need for cognition, out-of-school academic activities, academic interest, and behavioural engagement. In Chapter 7, we investigated how four factors – academic self-efficacy, self-regulated learning, academic motivation, and degree programme satisfaction – were related to the outcomes university GPA, number of obtained credits in university, and intention to persist. The question of interest was whether these factors would be directly related to the outcomes, or via academic adjustment. In both studies we used the following established fit statistics to assess whether the conceptual models fitted the data (Chen, Curran, Bollen, Kirby, & Paxton, 2008; Hu & Bentler, 1999; Kline, 2005; Steiger, 2007; Tucker & Lewis, 1973): the ratio of the chi-square to its degrees of freedom (χ^2/df), which should be less than 3; the root mean square error of approximation (RMSEA), which should be less than .07; the standardised root mean square residual (SRMR), which should be less than .08; and the CFI and TLI, which should at least be greater than .90, but preferably above .95. Furthermore, we looked at the sizes of the standardized path coefficients to assess the relative influence of the factors.

2.3.2 Latent profile analysis

In Chapter 5 the aim was to identify student engagement profiles in the last grade of secondary education and to see how these profiles related to academic adjustment and achievement one year later in university. To identify different profiles, we used latent profile analysis in Mplus. Latent profile analysis is a model-based type of cluster analysis, used to identify if there are hidden groups in the data based on the means of several continuous variables (indicator variables) and, if so, the number of groups that provide an optimal fit with the data. We used nine indicator variables, under three headings: (1) behavioural engagement (behavioural engagement and self-efficacy: effort); (2) cognitive engagement (surface learning; deep learning; metacognitive learning; self-regulated learning; (3) intellectual engagement (need for cognition; academic interest; self-efficacy: understanding). Two- to six-class solutions were tested. The optimal number of groups was identified by looking at the following fit statistics: Akaike's information criterion (AIC; Akaike, 1987); the Bayesion information criterion (BIC; Schwartz, 1978); the Adjusted BIC (ABIC); the Vuong-Lo-Mendell-Rubin likelihood ratio test (VLMRT; Vuong, 1989); and

the entropy statistic. Lower AIC, BIC, and ABIC values indicate a better fitting model (Flaherty & Kiff, 2012). If the VLMRT is significant, this means that the current number of groups is a better fit to the data than the model with one group fewer (Tofighi & Enders, 2008). Last, higher entropy statistics are better, as they signify less classification error (Collins & Lanza, 2010). Needless to say, we also checked whether the groups that were identified by the analysis were meaningful, i.e., whether they made sense and could have theoretical and practical value. After identifying the optimal number of groups, we assigned all students to the group they most likely belonged to and performed ANCOVAs to investigate group differences with regard to academic adjustment and achievement one year later in university. ANCOVAs were used so that we could control for the background variables age, gender, and coursework.

2.3.3 Framework analysis

Chapter 6 was a qualitative study by means of which we investigated secondary school teachers' beliefs about university readiness and their classroom practices regarding university preparation. We used framework analysis to analyse the transcripts of the 50 teacher interviews. This is a form of thematic analysis that uses five clear-cut steps to bring back a whole lot of data to meaningful answers to the research questions posed. These five steps, as developed by Ritchie and Spencer (1994), are 1) familiarisation; 2) identifying a thematic framework; 3) indexing; 4) charting; and 5) mapping and interpretation. We used the four-part model of college readiness by Conley (2008) as a starting framework to categorise the data on secondary school teachers' beliefs and practices regarding university preparation, but also let the data speak for themselves by giving room to themes that arose from the transcripts but were not part of Conley's model.

CHAPTER 3

A systematic review of factors related to first-year students' success in higher education

Based on: Van Rooij, E. C. M., Brouwer, J., Fokkens-Bruinsma, M., Jansen, E. P. W. A., Donche, V., & Noyens, D. (2018). A systematic review of factors related to first-year students' success in Dutch and Flemish higher education. *Pedagogische Studiën, accepted for publication.*

Abstract

This systematic review presents an overview of factors that play a role in explaining first-year GPA, number of obtained credits (EC), and persistence in Dutch and Flemish higher education. In total, 38 peer-reviewed articles were included, mostly Dutch studies with a sample of university students. With regard to individual explanatory factors, consistent relationships with GPA, EC, and persistence were found for secondary school GPA, secondary school science coursework, conscientiousness, intrinsic motivation, academic adjustment, lack of regulation, attendance, and observed learning activities. Self-efficacy, fear of failure, expectancies, and number of contact hours were consistently related to GPA and EC. Looking at the categories of factors, we found that ability factors, prior education characteristics, learning environment characteristics, and engagement were most successful in explaining success, i.e., factors within these categories revealed the most significant relationships with the three outcome variables. Within some categories, the results differed depending on which outcome variable was used. Ability mattered most in explaining student success when the outcome variables were GPA and EC, as did personality. Motivational factors were mainly important in predicting GPA, as were, to a small degree, certain learning strategies. Demographic factors mattered most often when the outcome was EC, and psychosocial factors when the outcomes were EC and persistence. Based on these results, recommendations for future research into student success in higher education are provided.

3.1 Introduction

In the last decade, increasing enrolments in higher education in Western countries have resulted in a higher diversity in the first-year student population in terms of ability, demographic factors, and prior education. Simultaneously, an increasing number of incoming students experience difficulties in meeting the academic requirements (Beerkens-Soo & Vossensteyn, 2009). The first year is an important transition phase in which many social and academic adaptations take place, as well as the evaluation, and possibly further exploration, of study choice decisions (e.g., Kyndt, Donche, Trigwell, & Lindblom-Ylänne, 2017). It is a well-known phenomenon that the dropout rates in the first year are substantially higher than those in subsequent years, and students who do not perform well in the first year are more likely to drop out later or to take more time to graduate (Beerkens-Soo & Vossensteyn, 2009; Flemish Government, 2014; McKenzie, Gow, & Schweitzer, 2004). As a consequence, more insight in factors that influence academic success in the first year of higher education is needed.

As in many Western countries, substantial numbers of dropout are prevalent in the Netherlands and Flanders, which are the countries we focus upon in this study. In the Netherlands, 30 to 40 per cent of first-year students in higher education do not continue to the second year of the programme they had initially started (Dutch Inspectorate of Education, 2017). In Flanders, approximately 60 per cent of higher education students do not pass the first year (Van Daal, Coertjens, Delvaux, Donche, & Van Petegem, 2013). Consequently, similar to other countries worldwide, understanding the explanatory base of student success represents an important public concern.

This review study provides an overview of student success correlates in the Netherlands and Flanders. The review firstly adds to the higher education literature because it provides a context-specific overview of factors that explain student success. The findings can be used by Dutch and Flemish researchers as an overview of existing research and input for new research. Secondly, the study shows how predictors of success may have differential impact on student success depending on the country (the Netherlands or Flanders), the level of education (professional or university education), and the outcome measure that is used (grade point average (GPA), number of obtained credits (EC), or persistence).

3.1.1 Research context: Professional and university education in the Netherlands and Flanders

Both in the Netherlands and Flanders, a binary system of higher education is present: professional and university education. This makes it possible to compare correlates with student success between these two levels. To our knowledge, this comparison has not been made before, even though there could be differences in the type and strength of success correlates, due to the differences in learning environment and student population. In the Netherlands, in general (i.e., notwithstanding differences between individual programmes), the learning content at universities is more abstract and less practical than that at institutes for professional education; the teaching speed is faster; more independent learning is expected from students; and large-scale lectures are more prevalent. At professional education, the focus lies on training students for a specific profession that is usually clear in advance. In line with this, internships are a prominent part of the curriculum: Whereas at universities it is common to only do an internship (or a research project) at the end of the degree programme, in most professional education programmes students do internships throughout the programme (University of Groningen, 2017a). Furthermore, there are quite some systematic student differences between university and professional education: The population of first-year university students, compared to first-year professional education students, is younger; more often has moved out of their parental home; and consists of fewer students with a migrant background, fewer first-generation students, and more international students (Van den Broek et al., 2017). In addition, there are discipline differences: More university students than professional education students pursue a science degree programme (39% respectively 26%) (Van den Broek et al., 2017).

It is also interesting to compare student success correlates between the Netherlands and Flanders, because besides the shared language and distinction between professional and university education, the systems have an important difference. The education system in the Netherlands is highly differentiated: After eight years of primary education students pursue secondary education at different levels. To obtain access to a degree programme at a research university, students need to be graduated from the six-year pre-university track, with some specific sub-track requirements for various programmes, or they need to hold a degree from professional higher education, with in some cases additional requirements. To pursue a degree in higher professional education, the five-year senior general secondary education track or a diploma from senior vocational education is

obligatory, again with in some cases additional requirements. The secondary education system in Flanders also consists of different tracks, but in contrast to the Dutch postsecondary education system, the Flemish system can be qualified as an open access system: Successful completion of any type of secondary education allows any student to enter any higher education programme without having to pass an entrance test (except in engineering, medicine, and dentistry). This may cause the first-year student population in Flanders to be more diverse than that in the Netherlands, and may imply that student factors such as ability and prior education are more influential in Flanders than in the Netherlands.

3.1.2 Different outcomes measures

A drawback of many studies into student success is that only one or two outcome variables are being used, while for the Dutch and Flemish context there are three outcome variables that matter with regard to first-year student success: GPA, number of attained credits (EC), and persistence (i.e., continuing to the second year of the degree programme that the student has started). The choice for a specific outcome measure may have large consequences for the results. This can be explained by the notion that outcome measures in themselves differ substantially from each other. A student's GPA is an indicator of his or her achievement level, whereas the number of EC is an indicator of study progress. Some students may mainly care about passing examinations, but not so much about how high their grades are, and consequently only put in the minimum effort required to pass. Persistence is yet again a distinct measure of success: Students with a high GPA who have attained all credits may deliberately choose to quit their studies, for several possible reasons, whereas students with a lower GPA and/or number of EC in the first year may choose to persist if they still meet the minimum requirements to continue. Thus, different processes play a role in explaining how high someone's GPA is, how many credits he or she obtains, and whether he or she drops out. For example, fear of failure or a low level of motivation may cause someone to obtain low grades, but not to a level that he or she does not pass an examination or quits his or her studies. Not being satisfied with the degree programme, on the other hand, may determine a student's decision to quit the programme, but may not have a negative effect on his or her achievement level before he or she quits. Due to these differences in measures of success, it is important to include all three of them and investigate whether cognitive and non-cognitive predictors affect them differently. This will contribute to more fine-grained knowledge about student success predictors.

3.1.3 The current study

Following from this, with the current systematic review of research on factors influencing first-year students' success in higher education in the Netherlands and Flanders, we seek to obtain a comprehensive picture of Dutch and Flemish student success correlates in the first year of higher education and possible differences between these countries, between professional education and university education, and based on the outcome variable that is used as a measure of student success. This brings us to the following two research questions that are central in this review study:

1. Which factors are important correlates of first-year student success in higher education in the Netherlands and Flanders?
2. Are there any notable differences between the Netherlands and Flanders; between professional education and university education; and based on the outcome variable (GPA, EC, or persistence)?

In addition, we aim to identify limitations and gaps in the current body of research on first-year success in the Netherlands and Flanders, in order to make recommendations for future research in the field of higher education in these countries.

3.2 Theoretical background

The conceptual framework that serves as a starting point for this review is based on an input-throughput-output model, as for instance used by Jansen and Bruinsma (2005). This type of model also underlies Tinto's interactionalist theory (Tinto, 1993), Braxton, Milem, and Sullivan's revision of Tinto's theory (2000) in which they refined elements in the model, and it can even be imposed on Biggs' 3P-model (presage, process, and product), although Biggs placed learning environment characteristics in the first group of factors, while we account them to the second group of factors (Biggs, Kember, & Leung, 2001). The model states that students start their studies with certain entry characteristics (input) such as ability, demographic factors, and prior education. We list these under the term 'student factors'. During the first year, students interact with and experience a certain learning environment (throughput). Under this, we gather characteristics and perceptions of the learning environment as well as factors related to students'

interaction with the learning environment, such as learning strategies and behavioural engagement. Last, the output factors are the three student success outcomes: GPA, EC, and persistence. The conceptual framework that lists all categories of factors is presented in Figure 3.1.

Below we will briefly describe the five student factors and the four factors related to (students' interaction with) the learning environment by defining the most important constructs within each factor, including their theoretical background.

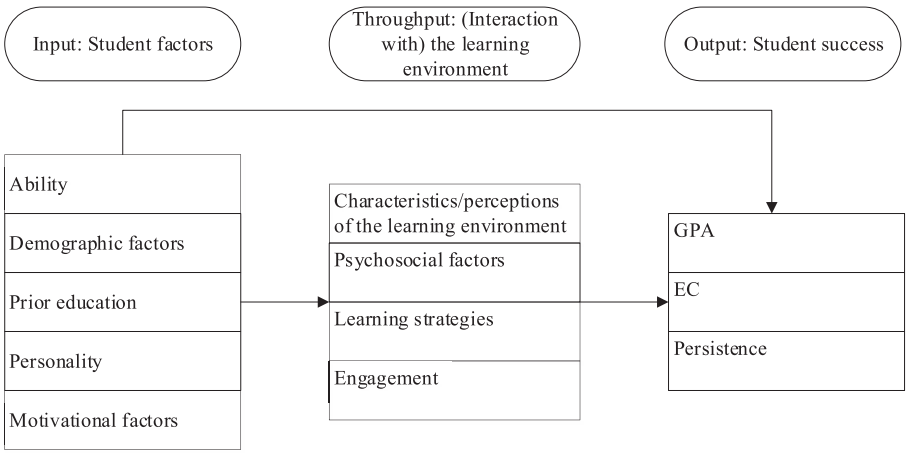

Figure 3.1 Conceptual model with nine categories of factors that are related to student success

3.2.1 Student factors

Ability, demographic characteristics, and prior education

Secondary school GPA is the most consistent universal predictor of achievement in higher education (e.g., Richardson et al., 2012). Since secondary school GPA is a measure that can be more easily obtained than an official measure of ability such as an intelligence test, many studies into higher education success use secondary school GPA as an indicator of ability. Demographic characteristics commonly included in studies into achievement in higher education are gender, age, socioeconomic status (SES), and ethnic background. Because in the Netherlands and Flanders the secondary education systems are differentiated, access to higher education is possible through different pathways, which means that students who enter postsecondary education differ regarding prior education. These differences

are differences regarding the level and type of prior education, but also differences regarding secondary school coursework.

Personality

Previous research also investigated the relationship between personality traits and academic achievement. The importance of personality traits in explaining achievement lies therein that whereas cognitive ability predicts what a student *can* do (i.e., maximum performance), personality contributes to the prediction of what a student *will* do (i.e., typical performance) (Furnham & Chamorro-Premuzic, 2004). The most widely used framework of personality is the five-factor model (FFM) of personality (McCrae & Costa, 1997), also known as the Big Five dimensions of personality, which consists of the dimensions of agreeableness, conscientiousness, neuroticism, extraversion, and openness to experience. Another personality characteristic that influences achievement is procrastination, i.e., "to voluntarily delay an intended course of action despite expecting to be worse off for the delay" (Steel, 2007, p. 66). Research showed that procrastination has sufficient temporal and situational stability to be perceived as a personality trait (Steel, 2007).

Motivation

Motivational variables are often used in studies into higher education success. Common motivation theories related to academic achievement are: a) theories that focus on self-efficacy and self-concept; b) theories that focus on reasons for engagement; and c) the expectancy-value theory (Eccles & Wigfield, 2002). Self-efficacy theories concern an individual's belief in how successful he or she will be in performing a certain task (Bandura, 1997). As such, this first type of theories relate achievement to individuals' efficacy expectations and outcome expectations. Within the second type of motivation theories, those focusing on reasons for people to engage in certain tasks, a prominent theory is the self-determination theory (Ryan & Deci, 2000). In this theory, the distinction between intrinsic and extrinsic motivation is important, i.e., performing an activity for sheer interest or fun respectively to obtain, gain, or avoid losing something. Another theory related to reasons for engagement is goal theory. Research into the relationship between goals and achievement tends to incorporate the distinction between performance and mastery goals. Performance goals can further be distinguished into performance-approach and performance-avoidance goals (Elliott & Church,

1997). Regarding the last type of motivation theories, modern expectancy-value theories relate achievement to the individual's expectancy and task value beliefs. Students' expectancies of learning results and, to a smaller extent, the value they adhere to the learning task at hand have been shown to relate to first-year achievement (Jones, Paretti, Hein, & Knott, 2010).

3.2.2 Factors related to (interaction with) the learning environment

Characteristics and perceptions of the learning environment

Learning environment characteristics are factors outside of students' control. Important and well-studied characteristics are the quantity of instruction, the perceived quality of the learning environment, and the teaching approach. The quantity of instruction can be measured by the number of contact hours in the programme (Bruinsma & Jansen, 2005). Perceived quality of the learning environment can consist of, among other things, students' perceptions of the quality of teachers, of the clarity of goals and standards, and of the quality of assessment (Ramsden, 1991). Research showed that student perceptions are reasonably reliable indicators of instructional quality (Pascarella, Seifert, & Whitt, 2008). Another important learning environment characteristic is the teaching approach. Whereas the teacher-centered approach – e.g., lectures for a large number of students with a focus on transmitting knowledge – used to be the standard teaching approach in postsecondary education for a long time, in the last decades, teachers have been using more student-centered teaching approaches (Davidson, Major, & Michaelsen, 2014). Characteristic of the latter approaches is that they focus on students' learning instead of on teachers' teaching (Cannon & Newble, 2000). An example of such a student-centered approach is problem-based learning (PBL), where students learn through the process of facilitated problem-solving (Hmelo-Silver, 2004). Student-centered approaches have been increasingly adopted in the Netherlands and Flanders in recent years.

Psychosocial factors

Psychosocial factors relate to the way students interact with and experience the higher education environment. In this regard, these factors combine student characteristics and characteristics of the learning environment. Most research on psychosocial factors in higher education draws on Tinto's (1975) theory of student attrition, which focuses on academic integration (e.g., identification with

academic norms and values), social integration (e.g., having good relationships with peers), institutional integration (e.g., feeling at home at the institution), and goal commitment (i.e., commitment to obtaining a degree) as predictors of retention (Richardson et al., 2012). Although Tinto's original model as a whole has been criticised (e.g., Brunsden, Davies, Shevlin, & Bracken, 2000), many studies in higher education still draw on his theory (e.g., Terenzini & Pascarella, 2005). Comparable to the constructs of academic and social integration are academic and social adjustment, which refer to the ability to cope with the academic respectively social demands of the postsecondary environment (Baker & Siryk, 1989). In addition to academic and social adjustment, personal-emotional adjustment and institutional attachment are often used, as these four types together form the Student Adaptation to College Questionnaire (Baker & Siryk, 1989), a widely used scale to measure adjustment. Other psychosocial constructs that have been the topic of investigation are social support and satisfaction with the degree programme.

Learning strategies

In higher education, where more independent learning is demanded from students than they were used to in secondary education, learning strategy use represents an important factor that can influence student success. Here, we focus on metacognitive and cognitive strategies. Metacognitive strategies refer to the processes regarding one's understanding of thinking, learning and performance. Examples of metacognitive strategies are planning, monitoring, and evaluation (Pintrich & de Groot, 1990). Cognitive strategies can be classified as either deep or surface learning strategies. Deep learning strategies are for example critical reading and elaboration, where the focus is to understand the study material and to make connections between the material and other knowledge or previous experiences. Surface learning strategies are concerned with reproducing the learning material. Besides deep and surface strategies, a third type of cognitive strategy is often investigated: concrete processing. Concrete processing is a strategy directed to studying in an application-oriented way, and to making connections between learning content and specific situations (Vermunt, 2005).

Behavioural engagement

It is often proposed that student characteristics, such as personality traits and motivation, and learning environment characteristics, such as the student-centeredness of the teaching approach, affect academic achievement through their

impact on students' engagement with learning. Student engagement has been a popular construct in higher education research in the last decade (Zepke, 2017a) and refers to students' involvement in education (Zepke, 2017b). Here, we focus on behavioural engagement. Compared to cognitive and emotional engagement, behavioural engagement is highly visible, because it consists of observable indicators such as attendance, time on task, active participation, and preparation (Christenson, Stout, & Pohl, 2012; Fredricks, Blumenfeld, & Paris, 2004).

3.3 Method

3.3.1 Database searches

To find relevant articles, we used search terms in line with the aims of our review. Since our review concerns higher education in the Netherlands and Flanders, we used "(university OR "higher education") AND (Netherlands OR Flanders OR Belgium)". Furthermore, relevant studies had to have an outcome measure indicating academic success, thus GPA, number of credits obtained (EC), retention (or the reverse, dropout), or study progress (or the reverse, delay). Therefore, we added "("stud* success" OR achiev* OR perform* OR "drop* out" OR complet* OR persist* OR retention OR attain* OR attrition OR progress*)" to the search terms. The databases we used for our search were ERIC, PsychINFO, Web of Science, and SocIndex.

3.3.2 Criteria for selecting studies

Eight inclusion criteria were applied for article selection, which are presented in Table 3.1.

We used 2000 as a time limitation, because papers older than 17 years would have been outdated. The eighth inclusion criterion concerned the scope of our review. The focus in this review is on student characteristics of first-year students in general and features of the learning environment. Hence, we excluded articles that focused on specific groups of students without reporting the results of the whole group, e.g., studies that focused on students with a migrant background, international students, or only female or male students. Moreover, papers that did not exclusively focus on first-year students, but on all bachelor students, were excluded. To assess the quality of the article, we applied the 'eight principles of scientific research' from the American Educational Research Association (AERA,

2008, see Table 3.2).

Table 3.1 Inclusion criteria

Inclusion criterion	Number of articles excluded for not meeting this criterion
1. The article has been peer-reviewed and published in an academic journal.	4
2. The data has been collected in 2000-2015.	8
3. The data has been collected in a Dutch or Flemish higher education institute.	5
4. The sample consisted of first-year students.	28
5. The outcome variable was GPA, number of attained credits, or retention (or dropout).	21
6. The sample size was larger than 30.	1
7. The data was original.	5
8. The independent variables were within the scope of our review.	4
9. The article meets the quality criteria by AERA (2008).	1

Table 3.2 The eight principles of scientific research as defined by AERA (2008)

A. Development of a logical, evidence-based chain of reasoning
B. Methods appropriate to the questions posed
C. Observational or experimental designs and instruments that provide reliable and generalisable findings
D. Data and analysis adequate to support findings
E. Explication of procedures and results clearly and in detail, including specification of the population to which the findings can be generalised
F. Adherence to professional norms of peer review
G. Dissemination of findings to contribute to scientific knowledge
H. Access to data for reanalysis, replication, and the opportunity to build on findings*

**As we did not perform a meta-analysis, we did not enquire for each article whether the data would be available.*

3.3.3 Initial and full-text screening, including quality assessment

From the list of hits from each database, we screened the articles on title and abstract. When the inclusion criteria were met in the abstract or when the abstract did not provide sufficient information to decide whether or not the article met the criteria, the article would continue to the phase of full-text screening. In total, 133 articles survived the initial screening of title and abstract. Among these, there were 19 duplicates, so 114 articles were left to be screened completely. During full-text screening, the main question was whether the article met all inclusion criteria. The 114 articles were divided amongst the authors. To guard the reliability of screening, 15 articles were screened by two authors. Since in all cases the authors independently agreed on whether or not to include an article, we proceeded with having each article checked by one author. Full-text screening resulted in the exclusion of 77 articles, so only 37 studies met the inclusion criteria. During

data extraction, the reference lists of the articles were screened for possible articles that we missed during the database search. One relevant article that was not yet included was found. After full text screening, this article met the inclusion criteria. Thus, a total of 38 articles were included in this review. Figure 3.2 shows the flowchart of the selection process and Table 3.1 the reasons for article exclusion.

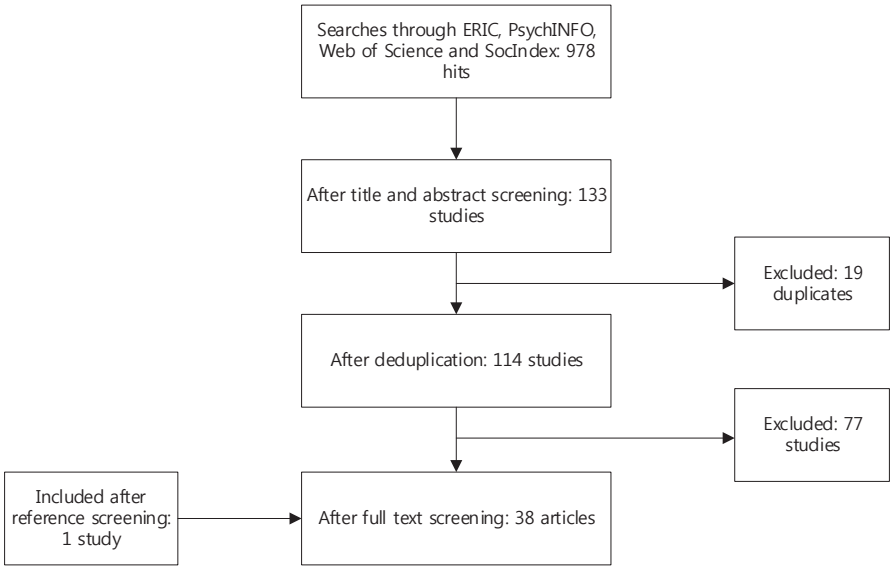

Figure 3.2 Flowchart of the paper selection process

3.3.4 Data extraction

We developed an extraction table (or coding scheme) in which the following descriptive and analytical data were collected from each included article: general information (authors, title, year, journal, country); research question(s); aim(s) of the study; theoretical framework (e.g., theories on which the research was based); educational level (university, professional, or both); sample size; degree programme (e.g., economics, or several programmes from five universities); design of the study and type of analysis; outcome variables; independent variables; main results; and, if applicable, possible relevant other results.

3.3.5 Data synthesis

As discussed above, our theoretical and analytical framework was based on an input-throughput-output model (see Figure 3.1), in which we integrated nine categories of student success predictors. As a first step in synthesising our data, we

categorised all independent variables that were used in the 38 studies. Variables that did not perfectly fit into a category were placed within the category they were most closely related to, e.g., 'mathematics GPA in secondary school' was placed in the category ability factors, as it can be seen as a sublevel of the ability factor secondary school GPA. Variables that did not fit into an existing category were ICT skills (De Wit, Heerwegh, & Verhoeven, 2012), results of a mathematics test (Fonteyne et al., 2015), results of a mathematics and of a language test (Pinxten et al., 2015), and career guidance GPA and first grade point average (Te Wierik, Beishuizen, & Van Os, 2015). These variables were excluded from the analysis. The data synthesis resulted in an overview of all investigated variables in the Netherlands and Flanders per category. Second, for each variable in each study we noted if this variable was (positively or negatively) significantly related to student success, i.e., to GPA, EC, and/or persistence, while retaining the information of whether this correlate concerned a Dutch or Flemish, and a professional education or university sample. Third, a more comprehensive picture was obtained of which variables were most consistently related to academic outcomes, and whether or not this was outcome-specific, country-specific, or specific for one of the educational levels. This was done by counting the number of positive, negative, and non-significant relationships and putting these together in one table per category. For reasons of expediency, but also because we wanted to compare results, variables that were only investigated by one study were excluded from these tables.

3.4 Results

3.4.1 Characteristics of the included studies

Table I in the Appendix presents an overview of the characteristics of the 38 included studies and their main findings. Most studies were published quite recently, i.e., in the 2010s (69%). Ten per cent was published between 2000 and 2006 and 21 per cent from 2006 to 2010. More than three quarters of all studies were performed in the Netherlands (29 of 38). Most studies were based on samples of university students (29), eight focused on professional bachelor education, and one had a mixed sample. Almost half of the studies (44%) used a sample of students from several degree programmes. The most used outcome measure was EC, present in 27 studies. As students in Flanders can apply for a certain number of credits in the beginning of the year, the Flemish studies did not use EC as an absolute measure, but used the

proportion of obtained credits in comparison to the attempted credits. GPA was used in 14 studies, and persistence in 12 studies. Fifteen studies used more than one outcome variable. Most studies were cross-sectional. The most frequently used methods of analysis were path analysis and regression analysis (46% respectively 36%). Other analyses used were methods to compare groups, multilevel analysis, correlation, and cluster analysis. We found many studies that used background variables (i.e., ability, demographic factors, and prior education) and variables from one or two other categories. More comprehensive studies, i.e., studies that used variables from three or more categories, were less common. Table 3.3 presents an overview of the foci of the studies included in this review.

Table 3.3 The categories included in the studies and the extent of integration of different categories

Categories	Number of Dutch studies	Number of Flemish studies	Total number of studies
1. Ability	17	3	20
2. Demographic factors	16	6	22
3. Prior education	8	6	14
4. Personality	4	1	5
5. Motivation	16	6	22
6. Characteristics and perceptions of the learning environment	15	0	15
7. Psychosocial factors	10	3	13
8. Learning strategies	8	2	10
9. Engagement	9	1	10
Integration of categories			
Background factors only (1, 2, and/or 3)	0	1	1
Background factors (1, 2, 3) + factor(s) from one other category	8	3	11
Background factors (1, 2, 3) + factor(s) from two other categories	9	2	11
Background factors (1, 2, 3) + factor(s) from three other categories	2	0	2
Background factors (1, 2, 3) + factor(s) from four other categories	3	0	3
No background factors + factor(s) from one category	2	1	3
No background factors + factor(s) from two categories	2	1	3
No background factors + factor(s) from three categories	3	1	4
Total number of studies	29	9	38

3.4.2 Synthesis of the results per category

Below we describe the results per category, which are presented in Tables II.1 to II.9 in the Appendix. These nine tables (one per category) show for each variable how many positive, negative, and non-significant relationships with the three student success outcomes were found in each of the two countries and at each of the two types of higher education.

Ability

From the indicators of ability, secondary school GPA was the most important predictor of GPA, EC, and persistence in Dutch and Flemish university education. All 16 studies that included secondary school GPA found positive effects. There were no studies with a professional education sample that included secondary school GPA. Secondary school mathematics GPA showed positive relationships with the three outcome variables as well, in two Dutch university studies. Intelligence did not have such a consistent effect: One Dutch university study found a positive effect on GPA and EC, but a Flemish study with a mixed university and professional education sample found no significant relationship with persistence.

Demographic characteristics

All Dutch and Flemish studies with a professional education sample (six studies) showed that female students performed better than male students. In studies using a university sample, only one study found a significant effect of gender on GPA (whereas four studies found no effect), three studies found an effect on EC (whereas six studies found no effect), and two studies found an effect on persistence (whereas three studies did not). Flemish studies more often found an effect of gender than Dutch studies, always in favour of female students. For age, only investigated by four Dutch studies, one non-significant relationship and one negative relationship with GPA were found in university samples. Regarding credits, one non-significant and two negative relationships were found in university samples. A study with a professional sample found no relationship with credits. Hence, when significant effects were found for age, they were in favour of younger students. Two Flemish studies showed positive relationships between SES and GPA, EC, and one positive and one non-significant relationship with persistence. In two Dutch university studies, two non-significant results were found for GPA, in addition to one positive relationship with EC. For ethnic background, two Dutch studies found that majority students had a significantly higher GPA and obtained more credits, whereas one Dutch study found no significant relationships with GPA and EC.

Prior education

A student's level of prior education was positively related to GPA and EC in two Dutch university studies, meaning that students who entered university

after completing pre-university education performed better than students who transferred to university after one year of professional education. In professional education, the relationship with prior education was less clear-cut: Two Dutch studies found that students who entered professional education after completing pre-university education obtained more EC than students from general secondary education, and that students from general secondary education obtained more EC than students from vocational education, but two other Dutch studies found no relationship. Another Dutch study found no relationship between prior education and persistence, whereas a Flemish study did find a relationship between level of prior education and persistence.

Students' coursework in secondary education consistently predicted GPA, EC, and persistence in university, with more positive results for students who had taken a science-oriented track (two Dutch and two Flemish studies) and students who had taken more hours of mathematics and classical languages (three Flemish studies).

Personality characteristics

In the two Dutch studies and one Flemish study that investigated the Big Five personality characteristics, conscientiousness was the most consistent predictor of academic success: It was positively related with GPA in a Dutch university sample, with EC in a professional education sample in both a Dutch and a Flemish study, and with persistence in a Dutch professional education sample. Only in a Dutch university sample it was not related to EC. For the personality characteristics agreeableness, extraversion, neuroticism, and openness, mostly non-significant relationships were found. Procrastination was negatively related to EC in both a professional education and a university sample in the Netherlands.

Motivational characteristics

Self-efficacy theories. From the perspective of students' expectancies regarding their own competence, we found in two Dutch and two Flemish studies that self-efficacy was consistently related to GPA and EC. Relationships between academic self-concept and all three outcomes were also all positive, as shown by three Flemish university studies. Another construct related to self-efficacy and self-concept that was investigated in more than one study was fear of failure. This was negatively related to GPA and EC in a Dutch university respectively professional education sample.

Reasons for engagement. The results of two Dutch university studies showed that intrinsic motivation was positively related to GPA, EC, and persistence. In Flemish university studies, it was positively related to GPA and EC, but not to persistence. One Flemish study that had a professional education sample found no relationship with EC or persistence. Extrinsic motivation was consistently unrelated to all outcomes in two Dutch and two Flemish studies. Motivation to study showed mostly positive effects on EC (in three out of four Dutch university studies, and in one Flemish professional education study) and persistence (in two out of three Dutch university studies). Lack of motivation, investigated by one Dutch and one Flemish professional education studies, was consistently negatively related to EC and persistence. Two Dutch university studies looked into the motivation to be involved in extracurricular activities and found a negative relationship with GPA, but no relationships with EC and persistence.

Expectancy-value theories. Only Dutch university studies used the expectancy-value theory. Expectancies showed relationships with GPA and credits in three studies, whereas the results regarding values and affect varied: For values, the four studies who investigated it found one positive and one non-significant result for GPA and the same for EC; for affects, one study found no relationship with GPA and another study a positive relationship with EC.

Characteristics and perceptions of the learning environment

Characteristics of the learning environment were only investigated by Dutch studies, mostly in university education. Regarding the quantity of instruction, results showed that the higher the study load, the lower students' GPA in university (two studies), and the higher the number of contact hours, the higher students' GPA in university (two studies) and EC (one study) in professional education. Regarding quality aspects of the learning environment, two university studies found a positive relationship between perceived quality of assessment and GPA. Regarding the perceived quality of organisation of the programme, one study found a positive relationship with GPA, and another a non-significant one (both at university). A student-centered learning environment, e.g., problem-based, had positive effects on Dutch university students' EC obtainment in two out of three studies. A small number of studies focused on preparation for university in secondary school. A positive relationship between the perceived fit between secondary school and university and EC was found in two studies. One of two studies found a positive effect of resemblance of the learning environment in school and university. The

three studies that focused on learning skills preparation in school found varying results: A professional study found a negative result on EC; a university study found a positive result on EC and no relationship with persistence.

Psychosocial factors

Looking at the results regarding Baker and Siryk's (1989) four aspects of adjustment – academic (investigated by one Dutch and two Flemish studies), social, personal-emotional, and institutional (all investigated by one Dutch and 2 Flemish study) – the results showed that academic adjustment and institutional attachment had the most positive relationships with GPA, EC, and persistence. Only between these types of adjustment and GPA, one Flemish university study found no significant relationships.

Furthermore, two Dutch university studies showed that students who were more satisfied with the degree programme obtained more credits and were more likely to persist.

Learning strategies

The four Dutch and one Flemish studies that looked at self-regulation reported more non-significant relationships between self-regulation and student success than positive ones: Only two Dutch university studies found a positive relationship, one for GPA and one for EC. For external regulation, a Dutch university study found a negative relationship with GPA, a Dutch professional study found no relationship with EC and persistence, and one Flemish professional study found a positive relationship with credits, but no relationship with persistence. Lack of regulation, however, showed consistent negative relationships with GPA (Dutch university sample) and EC and persistence (Dutch and Flemish professional education samples).

Only non-significant results were found for deep learning in one Flemish professional education study and three Dutch university studies. Two subcategories of deep learning, relating and structuring and critical processing, however, did show positive relationships with GPA in a Dutch university study. A Flemish professional education study found a positive relationship with EC for relating and structuring, but not with persistence. Critical processing was not related to Flemish professional students' EC and persistence. Analysing was not related to university students' GPA or professional students' EC, but only to professional students' persistence.

Surface learning was not related to EC and persistence among Dutch professional students and negatively related to Flemish university students' GPA. Memorising, a subcategory of surface learning, showed no significant relationships in either Dutch university students or Flemish professional students.

Concrete processing was not related to Flemish professional students' EC or persistence, but positively to Dutch university students' GPA.

Two Dutch university studies looked at conceptions of learning: Students who had a conception of learning as knowledge construction obtained a higher GPA in one study, but the other study found no effects on persistence. A conception of learning as being a cooperative process was negatively related to GPA in one study, but unrelated to persistence in the other.

Behavioural engagement

Only Dutch studies investigated the effects of indicators of behavioural engagement on academic results. Attendance, both lecture attendance (two studies) and tutorial attendance (three studies), showed consistent positive relationships with the three outcome measures in university samples. Observed learning activities (two studies) were also positively related to GPA, EC, and persistence in university. Regular study behaviour was positively related to persistence in both university studies that investigated it, but only related to EC in one study. Self-study time (four studies) was positively related to professional students' EC, to university students' GPA and persistence, and to university students' EC in one out of two studies.

3.5 Conclusion and discussion

This review aimed to obtain an overview of important correlates of first-year achievement (GPA and EC) and persistence in higher education in the Netherlands and Flanders. By doing so, we show the current standings of Dutch and Flemish research into first-year higher education students' success and identify limitations and gaps in the current body of research, in order to make recommendations for future research.

3.5.1 Most important findings

Thirty-eight peer-reviewed articles were included in this review. Most of them were Dutch (29) and most focused on university education (29). The categories of

demographic characteristics and motivational factors were the most investigated categories. Furthermore, ability (predominantly secondary school GPA) was often included. Dutch researchers included learning environment characteristics and engagement relatively often in their studies, whereas Flemish authors relatively more often focused on demographic characteristics and motivation.

Overall, for several factors we found evidence of a relationship with all outcomes of student success. This was most notably the case for the relationship between secondary school GPA and secondary school coursework with university students' success in both the Netherlands and Flanders: Students who had higher grades in secondary school and took more science subjects and mathematics achieved better in university and were more likely to continue to the second year. The result regarding secondary school GPA was expected, as this is a very consistent universal predictor of higher education success (e.g., Richardson et al., 2012). The benefits of taking up more science (in this case, a science track in Dutch secondary education, which includes more advanced mathematics, or more hours of science and mathematics in Flanders) does not appear systematically in the international empirical research, even though it has been found to be important in other countries. For example, Long, Iatarola, and Conger (2009) point to the problem that in the United States many students are unprepared for mathematical courses in higher education due to insufficient mathematics preparation in secondary school. Many university degree programmes in the sciences and social sciences have mathematics-related courses, which may explain why a secondary school background of science and mathematics contributes to higher achievement in university.

Conscientiousness, intrinsic motivation, academic adjustment, lack of regulation, attendance, and observed learning activities were also related to all outcomes, although these results were based on a smaller number of studies. The clear impact of conscientiousness is in line with Poropat's (2009) meta-analysis of personality factors that showed that conscientiousness is the most important personality trait when it comes to predicting academic performance. The effect of intrinsic motivation matches the findings of many studies into motivation that conclude that intrinsic motivation is linked to achievement (Clark, Middleton, Nguyen, & Zwick, 2014; Guiffrida, Lynch, Wall, & Abel, 2013). In contrast, international research findings regarding extrinsic motivation are equivocal: Sometimes extrinsic motivation was negatively related to achievement, sometimes positively, and sometimes no relationship was found (Clark et al., 2014). In our

review, however, none of the studies that included extrinsic motivation found a significant relationship with success outcomes. That academic adjustment was a significant predictor in our review is not unexpected, since prior literature consistently showed the pivotal role of academic adjustment in predicting achievement (McKenzie & Schweitzer, 2001) and persistence (Kennedy, Sheckley, & Kehrhahn, 2000) in higher education. Social adjustment, in contrast, was not always found to be a significant predictor of GPA in the literature (McKenzie & Schweitzer, 2001; Petersen, Louw, & Dumont, 2009), which is in line with our results regarding social adjustment. We found that lack of regulation was negatively related to all success outcomes in both university and professional education, but, surprisingly, that self-regulation was not related to success in five of the seven investigated relationships. We expected more positive results, in line with research that showed the importance of metacognitive strategy use such as self-regulation (Credé & Phillips, 2011; Richardson et al., 2012; Robbins et al., 2004). Important to note, however, is that the significant relationships that were found between self-regulation and achievement concerned university samples, so this may point to a difference between professional education and university education, in the sense that self-regulated learning may be relatively more important in university – or at least that only in university self-regulated learning skills are reflected in GPA in EC. More research about the value of different types of regulation and their relationship to success at different levels of higher education would be welcome. Last, the importance of attendance and observed learning activities that we saw in this review showed that behavioural engagement matters. Historically, Astin's theory of student involvement (1999) already pointed to the importance of engagement, and more recent research corroborates its importance. Class attendance, for example, has been reported to add to the prediction of grades in higher education over intelligence and personality traits (e.g., Conard, 2006; Farsides & Woodfield, 2003).

Looking at the category of learning strategies, we found non-significant relationships with all three outcomes for deep learning and memorising (a surface learning strategy). This was surprising, as the literature shows both positive and negative results of these factors (e.g., Richardson et al., 2012). An explanation for the non-significant results could be that questionnaires often ask about students' preferred or usual strategy use, but the use of learning strategies likely depends on external characteristics, such as the study task at hand or the course (Vermunt & Donche, 2005). Sometimes deep learning is rewarded and sometimes surface

learning; different evaluation approaches may thus influence learners' strategy use (Vermunt, 2005). This nuance gets lost when researchers look at students' general strategy use as explanatory factor and to very broad outcome measures such as first-year GPA, total number of obtained credits, and persistence.

For a number of factors, we found relationships with GPA and credits, over the different countries and education levels: self-efficacy, fear of failure, expectancies, and number of contact hours. Results regarding self-efficacy, fear of failure, and expectancies are in line with the international higher education literature (Jones et al., 2010; Richardson et al., 2012; Robbins et al., 2004). Regarding contact hours, however, there is also research that reported no effects or even negative effects of the quantity of contact hours (e.g., Schmidt et al., 2010). Moreover, the connection between number of contact hours and achievement is not that meaningful without knowing what is happening in those hours. The fact that we did see the connection in our review can be explained by the following: "Very little class contact may result in a lack of clarity about what students should be studying, a lack of conceptual framework within conceptual study can be framed, a lack of engagement with the subject, a lack of oral feedback on their understanding, and so on" (Gibbs, 2010, p. 22). Even though they found negative effects of the number of contact hours, Schmidt et al. (2010) also pointed out that a minimum number of lectures is necessary. Extensive lecturing, however, should be avoided, so that sufficient time is available for self-study, because their study found that time available for self-study was related to graduation rate and study duration. In our review, we also found that self-study time was positively related to success outcomes in four of the five investigated relationships.

For degree programme satisfaction, we found significant relationships with credits and persistence, which is in line with previous literature that shows that satisfaction with the programme is related to persistence (De Buck, 2009; Yorke & Longden, 2007).

3.5.2 Differential results based on outcome measure

The vast majority of factors was each investigated by only a small number of studies (usually two or three), which makes it impossible to draw conclusions regarding differential results based on the outcome measure that is used – GPA, EC, or persistence. On the level of the categories, however, we saw some trends. The category of ability showed many significant relationships, mostly with GPA and EC. Demographic factors were only significant predictors of success in half

of the instances, but if they were, they were mostly related to EC. Prior education was a useful category in the sense that it revealed significant relationships with all outcomes. In Flemish studies, these were all significant; in the Netherlands in nine out of 13 instances. Half of the investigated relationships in the personality category were significant – mostly with regard to GPA and EC. The motivation category showed more significant results, and there was a clear pattern: Two thirds of the investigated relationships with GPA were significant, half of the relationships with EC, and substantially less than half of those with persistence. The category learning environment characteristics also revealed many relationships with GPA and EC. About one third of the investigated relationships with psychosocial variables were significant. This was mainly the case for EC and for persistence. The category of learning strategies only revealed significant results in 17 of 44 investigated relationships, mostly with GPA. Last, the engagement category showed many positive relationships with all outcomes.

Thus, motivational factors seemed to be most important in determining how high students' grades are. Learning strategies were not often related to student success, but if they were, this was also mostly the case for GPA. Demographic factors were mainly important for explaining the number of credits students obtain. Psychosocial factors mattered mostly when predicting both the number of credits and whether or not students persisted, which matches well with Tinto's model of attrition (1975) in which psychosocial variables predicted whether or not a student would drop out. Ability and personality were mainly important for achievement (GPA and EC), but not for persistence. Prior education, characteristics of the learning environment, and engagement were equally important for all outcomes.

3.5.3 Differences based on country and educational level

When we look at the categories and the number of relationships that were found within the categories for the countries, we see that demographic factors and prior education were somewhat more often related to success in Flanders, which could be attributable to the open access system, but the number of Flemish studies is too low to draw firm conclusions about this.

Furthermore, although more research is needed, some trends can be distinguished between studies in professional and university education. One difference particularly strikes the eye: Gender was consistently related to credits and persistence in professional education students (nine of nine investigated relationships), whereas for university students it only had impact in some

instances (six of 19). International research from this century quite consistently showed that female students outperform male students in higher education (e.g., Conger & Long, 2010; Hillman & Robinson, 2016; Richardson et al., 2012), although the gender gap in higher education is not as large as it is in primary and secondary education (Voyer & Voyer, 2014). Our results indicate that, at least in the Netherlands and Flanders, the gender gap is larger in professional education than in university education. Other differences were that the level of prior education and factors within the categories personality factors and learning strategies were more often related to success outcomes in university than in professional education.

3.5.4 Limitations of Dutch and Flemish first-year student success research

Many articles did not clearly define the measured constructs and/or did not describe thoroughly how the constructs were measured. Moreover, sometimes different names were given to constructs with a comparable definition. For example, Meeuwisse, Severiens, and Born (2010) defined informal peer interaction as interaction among students regarding personal matters, whereas Severiens and Wolff (2008) labeled this exact same definition as informal social integration. These differences in naming and defining constructs, as well as differences in the operationalisation of constructs, makes it difficult to evaluate and compare previous research findings. Furthermore, rather than using (inter) nationally validated instruments, many studies used instruments developed by the researchers themselves, which also makes it more difficult to compare results from different studies.

Another issue concerns the outcome variables used. We found that the presence and strength of a relationship with academic success depends on how academic success is measured. Motivational factors, for example, often related to GPA and credit obtainment, but not to persistence. Also, most studies used EC as the only outcome measure, which is also reflected in the general results: The clearest evidence concerns the relationships with EC, whereas only for a few variables it is clear that they are related to persistence. It would be worthwhile if more studies would use multiple outcome variables, to investigate differential effects.

3.5.5 Limitations of this review

One limitation of this review study is that the number of Flemish studies that fit the inclusion criteria was too low to compare the Dutch and Flemish studies in

terms of factors predicting students' success in the first year. One reason for this is that we only included peer-reviewed papers in academic journals. Quite some cross-sectional and longitudinal Flemish research on first-year student success has been published as a book (chapter) or research report (e.g., Donche, Coertjens, Van Daal, De Maeyer, & Van Petegem, 2013; Donche & Van Petegem, 2011; Van Daal et al., 2013; Van Esbroeck et al., 2001). It would have been interesting to see whether there would be differences between the Netherlands and Flanders that could be attributable to the different systems, i.e., the Flemish higher education system, which is accessible from all levels of secondary education, and the Dutch higher education system, that has more access restrictions by requiring a certain level of the secondary education diploma.

Second, we chose to only include factors in the analysis that were investigated by at least two studies, because only then we could compare the results. This left out some interesting factors that had only been investigated by one study, such as employment, self-esteem, attributional style, the study choice process in secondary school, and the attention paid to skill development in the curriculum.

A third limitation is that this review is a narrative synthesis and not a meta-analysis. Although a meta-analysis would have provided stronger evidence, we decided not to perform a meta-analysis because this would have put even stricter criteria on the data in the studies. Consequently, performing a meta-analysis would have resulted in the loss of even more studies. Another meta-analysis assumption that could not be met is that the underlying constructs are the same. Many variables that we included in the results were investigated by just one or two studies. Furthermore, as we discussed above, many studies had different operationalisations of the same construct. Thus, performing a meta-analysis would have meant that we could only have focused on factors that were investigated in the same way by multiple studies, which would have led to a substantive loss of information.

As in many reviews, the results might be distorted by publication bias. We do not believe, however, that this is a considerable problem in our review, since many studies included multiple variables, some of which had significant relationships with academic outcomes and some of which did not, which is why non-significant results could in most cases not have been a reason for non-publication. Nevertheless, it would have been interesting to also include policy reports, book chapters, papers published in professional literature, and PhD and

master theses.

The fact that many studies included multiple independent variables did cause another limitation though: By investigating the impact of several variables on the outcome of interest simultaneously, e.g., in stepwise regression analysis, effects of individual predictors can be concealed. Fortunately, a large majority of papers that used regression analysis also included correlation matrices, so the potential distortion in this regard is limited.

Last, we did not take into account differences between fields of study. Some studies that used a sample of students from different degree programmes also performed separate analyses per programme and found small differences between these programmes. However, due to reasons of efficiency we only looked at their general findings.

3.5.6 Recommendations for future research

Some influential variables in international research were hardly present in the Dutch and Flemish studies, such as need for cognition and mastery and performance goals. It would be interesting if Dutch and Flemish researchers would take specific notice of these variables in future research. We also found that some categories were more often being investigated in the Netherlands and others in Flanders. Few respectively none of the Flemish studies included engagement or learning environment variables and relatively little attention in Dutch studies was paid to demographic factors, the subject uptake in secondary school, and motivation. Flemish and Dutch researchers could include these relatively understudied topics, since they showed relationships with academic success.

Furthermore, future research should consider the conceptual and methodological issues that came to light in this review, namely that too often constructs are not clearly defined and/or measured by newly developed instruments. To obtain reliable and comparable data, and consequently work towards a comprehensive picture of what matters for student success and the extent to which certain factors have a higher impact in certain countries or education systems, it would be extremely helpful if researchers would use uniform definitions of factors and the same instruments when they investigate the same factors. Nevertheless, the problem with translations remains and adaptations to the context are sometimes necessary, because some items may not be appropriate in a certain context.

Since we were not able to draw a firm comparison between the Netherlands

and Flanders, it would be interesting to design a large-scale comparative study that would investigate possible differences in academic success predictors between these two countries that could perhaps be attributable to the closed versus open access system. Variables that proved in this review to be consistently related to academic outcomes could be included in this research, as well as the variables that yielded less conclusive results or only results for one or two success outcomes, which causes us to keep wondering about their (overall) impact. Also, it would be interesting to take a systematic look at possible differences between fields of study, as some studies found that some factors were only related to students' outcomes in some degree programmes or there were differences in the strength of the relationships (e.g., Kamphorst, Hofman, Jansen, & Terlouw, 2012; Vermunt, 2005).

The same is the case for comparing professional education and university education. We only clearly found that gender was more important in professional than in university education. If the existence of differences in other categories would be systematically investigated, we would gain insight in what makes professional students and university students successful in the first year, which would help institutes to tailor their first-year programme to the students' needs.

A fruitful first step to strengthen research and further theory development on the impact of different factors on student success in Dutch and Flemish higher education would be to develop an instrument repository with validated Dutch translations of instruments that is open for use by researchers in this field and to establish more collaborations between researchers at different higher education institutes, so that large-scale studies can be more jointly designed.

Appendix

Table I Overview of the characteristics and main results of the included studies

Ref. nr.	Author (year)	Country / Level of education / Degree programme	Analysis	Outcome variables	Category: independent variables used in the study	Main findings (pertaining to the review)
1	Arnold & Straten (2012)	Netherlands / University / Economics	Regression	EC GPA Persistence	*Ability:* secondary school GPA, secondary school mathematics GPA *Demographic:* gender *Prior education:* secondary school track *Motivation:* intrinsic motivation, extrinsic motivation, extracurricular motivation, Rotterdam motivation	Intrinsic motivation affected all outcome measures positively. A preference for extracurricular activities influenced GPA and maximum attainment negatively. Students from a science track, with a higher secondary school GPA, and a higher secondary school mathematics GPA scored higher on all outcomes. High intrinsic motivation could partly substitute coming from a non-science secondary school track and having a low secondary school mathematics GPA.
2	Arnold & Rowaan (2014)	Netherlands / University / Economics and Econometrics	Regression	EC	*Ability*: secondary school GPA, secondary school mathematics GPA *Demographic:* gender *Prior education:* secondary school track *Motivation*: intrinsic motivation, extrinsic motivation, extracurricular motivation, Rotterdam motivation	Secondary school GPA, secondary school mathematics GPA, secondary school track, and intrinsic motivation influenced EC. There was no strong evidence for a gender gap in economics students' study success.
3	Baars, Bijvank, Tonnaer, & Jolles (2015)	Netherlands / Professional education / Hospitality Business	Regression	EC	*Demographic*: age, gender *Prior education:* level of prior education *Learning strategies*: attention, planning, self-control and self-monitoring	The levels of attention, planning and self-control and self-monitoring were predictive of EC. The effect of lack of self-control and self-monitoring was larger in male students than in female students.
4	Beyers & Goossens (2002)	Flanders / University / Psychology	Correlation	GPA Persistence	*Psychosocial:* academic adjustment, social adjustment, personal-emotional adjustment, institutional attachment, total adjustment	There were modest correlations between academic adjustment, social adjustment, personal-emotional adjustment, institutional attachment, total adjustment and attrition after one year. Academic adjustment was only related to GPA after one semester, not after a year.

Table I (continued) Overview of the characteristics and main results of the included studies

Ref. nr.	Author (year)	Country / Level of education / Degree programme	Analysis	Outcome variables	Category: independent variables used in the study	Main findings (pertaining to the review)
5	Bruinsma (2003)	Netherlands / University / Several programmes	Path analysis	EC	*Ability*: secondary school GPA *Demographic:* gender, age *Motivation*: expectancies, values, affects *Learning strategies*: deep learning	Students with higher expectancies, values, and affects used deep learning strategies more often, but deep learning was not related to the number of EC. Expectations, age - younger students obtained more EC - and secondary school GPA had a direct effect on EC.
6	Bruinsma & Jansen (2005)	Netherlands / University / Science programmes	Multilevel analysis	GPA	*Ability*: secondary school GPA *Motivation*: expectancies *Learning environment*: study load, number of contact hours, quality of assessment, quality of teacher behaviour	Secondary school GPA, expectancies, and quantity of instruction (study load and number of contact hours) were related to GPA in two cohorts. These relationships were positive, except for study load, which was negatively related to GPA. Quality of assessment was related to GPA in one cohort.
7	Bruinsma & Jansen (2007)	Netherlands / University / Science programmes	Multilevel analysis	GPA	*Ability*: secondary school GPA *Demographic:* age, SES *Motivation*: expectancies, values, affects *Learning environment*: study load, number of contact hours, quality of content, quality of structure and organization, quality of assessment, instructional pace, classroom climate *Psychosocial:* support by peers	Students with a higher secondary school GPA, higher expectancies, who became more motivated at the end of the year, who had less study load, more contact hours, and who rated the quality of assessment and classroom climate higher obtained a higher GPA.

Table I (continued) Overview of the characteristics and main results of the included studies

Ref. nr.	Author (year)	Country / Level of education / Degree programme	Analysis	Outcome variables	Category: independent variables used in the study	Main findings (pertaining to the review)
8	De Feyter, Caers, Vigna, & Berings (2012)	Flanders / Professional education / Business Administration	Regression	EC	*Personality*: neuroticism, extraversion, openness, agreeableness, conscientiousness *Motivation*: self-efficacy, academic motivation	Personality factors were better predictors of performance than academic motivation. Conscientiousness and extraversion predicted academic motivation, but only for highly conscientious students this effect continued into a higher performance. Extraversion had a negative direct effect on performance. Agreeableness, neuroticism, and self-efficacy had a positive direct effect on performance. The effect of neuroticism on performance was moderated by self-efficacy.
9	De Koning, Loyens, Rikers, Smeets, & Van der Molen (2012)	Netherlands / University / Psychology	Regression	EC GPA	*Ability*: secondary school GPA, intelligence *Demographic:* gender, nationality, age *Prior education:* prior education *Personality*: neuroticism, extraversion, openness, agreeableness, conscientiousness *Engagement:* observed learning activities, self-study time	Students with higher scores on observed learning activities and lower scores on neuroticism and openness obtained more EC and had a higher GPA. Self-study time, extraversion (negatively) and conscientiousness only influenced GPA. From the background variables, prior education influenced EC and GPA: Students from pre-university education obtained more credits and had a higher GPA. Secondary school GPA and intelligence (word matrix and non-verbal abstraction) only influenced GPA.
10	De Koning, Loyens, Rikers, Smeets, & Van der Molen (2014)	Netherlands / University / Psychology	ANCOVA	EC GPA	*Learning environment*: BSA	The pre-BSA cohort obtained a significantly higher GPA and had a higher number of EC than the BSA cohort.

Table I (continued) Overview of the characteristics and main results of the included studies

Ref. nr.	Author (year)	Country / Level of education / Degree programme	Analysis	Outcome variables	Category: independent variables used in the study	Main findings (pertaining to the review)
11	De Wit, Heerwegh, & Verhoeven (2012)	Flanders / University / All programmes at one university	Regression	EC GPA Persistence	*Ability*: secondary school GPA *Demographic:* gender, SES *Prior education:* secondary school hours of mathematics, secondary school hours of classical languages *Motivation*: intrinsic motivation *Psychosocial*: engagement in social activities, ambivalent attitude towards study choice	Predictors of retention were secondary school hours of mathematics, ambivalence towards the study choice (negative effect), secondary school GPA, and secondary school hours of classical languages. Predictors of study efficiency (i.e., percentage of exams passed, comparable to EC) and GPA were secondary school GPA, secondary school hours of mathematics, ambivalence towards the study choice (negative effect), secondary school hours of classical languages, intrinsic motivation, and educational level of the parents.
12	Ferla, Valcke, & Schuyten (2010)	Flanders / University / Psychology and Educational Sciences	Path analysis	GPA	*Motivation*: academic self-efficacy, self-efficacy for self-regulation, academic self-concept, perceived level of understanding, mastery goals, performance achievement goals, performance avoidance goals *Learning strategies*: deep learning, surface learning *Engagement*: persistence	Academic self-efficacy substantially predicted GPA. Persistence (positive) and surface learning (negative) also predicted GPA. Perceived level of understanding (negative), self-efficacy for self-regulated learning, mastery goals, and performance approach goals influenced persistence, and perceived level of understanding negatively influenced surface learning.

Table I (continued) Overview of the characteristics and main results of the included studies

Ref. nr.	Author (year)	Country / Level of education / Degree programme	Analysis	Outcome variables	Category: independent variables used in the study	Main findings (pertaining to the review)
13	Fonteyne et al. (2014)	Flanders / University / Psychology and Educational Sciences	Regression	Persistence	*Demographic*: gender *Prior education:* level of prior education, secondary school hours of mathematics, secondary school track *Other (not used in this review)*: mathematics test	The basic mathematics test, together with prior education, explained 20% of the variance in passing the first year. Students from general secondary education programmes passed more often than students from technical, arts, or vocational secondary education programmes. Students from programmes with a higher focus on science and classical languages passed more often than students from a programme with a focus on social sciences, languages, and economics. Students who took more hours of mathematics in secondary school passed more often.
14	Germeijs & Verschueren (2006)	Flanders / University and professional education / Several programmes at several institutes	Regression	Persistence	*Ability:* cognitive ability *Demographic:* gender *Prior education:* career decisional tasks during secondary school (orientation to choice, self-exploratory behaviour, broad exploratory behaviour, in-depth exploratory behaviour, decisional status, commitment) *Psychosocial*: academic adjustment, commitment, choice actualisation in higher education	Choice actualisation, commitment, and academic adjustment influenced the odds of passing the first year. Passing the first year could not be directly predicted from students' coping with the career decisional tasks at the end of grade 12.
15	Jansen & Suhre (2010)	Netherlands / University / Law	Path analysis	EC Persistence	*Ability*: secondary school GPA *Motivation*: study motivation *Learning environment:* time management preparation in secondary school, learning skills preparation in secondary school *Psychosocial*: degree programme satisfaction *Engagement:* regular study behaviour, tutorial attendance	EC was affected by degree programme satisfaction, tutorial attendance, and secondary school GPA. Dropout was negatively influenced by degree programme satisfaction. Preparation in time management and learning skills positively affected motivation and study behaviour and thereby enhanced academic achievement.

Table I (continued) Overview of the characteristics and main results of the included studies

Ref. nr.	Author (year)	Country / Level of education / Degree programme	Analysis	Outcome variables	Category: independent variables used in the study	Main findings (pertaining to the review)
16	Kamphorst, Hofman, Jansen, & Terlouw (2012)	Netherlands / Professional education / Several programmes at five institutes	Path analysis	EC	*Demographic*: gender *Prior education:* level of prior education *Motivation:* intention to persist *Learning environment*: contact hours, preparation through active learning skills in secondary school, preparation of academic knowledge and skills in secondary school *Psychosocial*: satisfaction with active learning, satisfaction with academic knowledge and skills, integration *Engagement*: independent study hours	Intention to persist was the strongest predictor of EC. Other predictors were gender (in favour of females), preparation through active learning (negative), contact hours, independent study hours, satisfaction with academic knowledge and skills, and integration. The models that explained EC differed per study field.
17	Kamphorst, Hofman, Jansen, & Terlouw (2013)	Netherlands / University / Several programmes at one institute	Path analysis	EC	*Personality*: procrastination *Motivation*: intrinsic value, perceived competence *Learning strategies*: deep learning, self-regulation	EC was positively influenced by perceived competence and negatively by procrastination. Intrinsic value and self-regulation affected procrastination negatively. Self-regulation, deep learning, and intrinsic value affected perceived competence.
18	Kamphorst, Hofman, Jansen, & Terlouw (2015)	Netherlands / Professional education / Engineering	Path analysis, t-test	EC Persistence	*Demographic:* gender *Psychosocial*: academic integration	Female students were more successful than male students in terms of EC obtainment and retention. For both men and women, academic integration predicted EC.

Table I (continued) Overview of the characteristics and main results of the included studies

Ref. nr.	Author (year)	Country / Level of education / Degree programme	Analysis	Outcome variables	Category: independent variables used in the study	Main findings (pertaining to the review)
19	Loyens, Rikers, & Schmidt (2007)	Netherlands / University / Psychology	Path analysis	Persistence	*Motivation*: motivation to learn, self-perceived inability to learn *Learning strategies*: knowledge construction, cooperative learning, authentic problems *Engagement*: study time, observed learning activities	Self-study time and the conception of learning as knowledge construction were related to observed learning activities. Self-perceived inability to learn and motivation to learn led to self-study time. Observed learning activities and self-study time were related to dropout. The conception of learning as knowledge construction was related to learning activities and self-perceived inability to learn, and motivation to learn was related to self-study time.
20	Meeuwisse, Severiens, & Born (2010)	Netherlands / University / Several programmes at four universities	Path analysis	EC	*Demographic*: majority or minority *Learning environment*: activating learning environment *Psychosocial*: sense of belonging	In the model for all students, EC was influenced by sense of belonging. Sense of belonging was influenced by formal teacher interaction, formal peer interaction, and informal peer interaction. Learning environment was related to all types of interaction.
21	Pinxten, De Fraine, Van den Noortgate, Van Damme, Boonen, & Vanlaar (2015)	Flanders / University / Several programmes at several universitites	Regression	Persistence	*Demographic*: gender, SES *Prior education:* weekly hours of mathematics, science, economics, classical, and modern languages *Motivation*: academic self-concept, occupational interests, future aspirations *Other*: language test, mathematics test at the end of G12	Students with better scores on the mathematics and language tests at the end of secondary education and who had had more hours of mathematics, science, and classical languages in secondary school were more likely to pass the first year. Controlled for secondary school achievement and subject uptake, female students, students from a higher SES, and students with a more positive self-concept were more likely to succeed.

Table I (continued) Overview of the characteristics and main results of the included studies

Ref. nr.	Author (year)	Country / Level of education / Degree programme	Analysis	Outcome variables	Category: independent variables used in the study	Main findings (pertaining to the review)
22	Rienties, Beausaert, Grohnert, Niemantsverdriet, & Kommers (2012)	Netherlands / University / Business programmes at several institutes	Regression	EC GPA	*Psychosocial*: academic adjustment, social adjustment, personal-emotional adjustment, institutional attachment, perception of the faculty, study support, students' satisfaction with social life, financial support	GPA and EC were influenced by academic adjustment and (to a smaller extent) by institutional attachment. In addition, EC obtainment was affected by personal-emotional adjustment and perception of the faculty.
23	Severiens & Schmidt (2009)	Netherlands / University / Psychology	Path analysis, ANOVA	EC	*Learning environment*: extent of problem-based learning (PBL) focus *Psychosocial*: formal academic integration, informal academic integration, formal social integration, informal social integration	Students in a problem-based learning environment had higher formal and informal academic integration and higher formal social integration. PBL was also directly related to EC. Formal social integration positively affected EC, whereas informal academic integration negatively affected EC.
24	Severiens & Wolff (2008)	Netherlands / University / Several programmes	Path analysis	EC GPA	*Demographic:* gender, SES, majority or minority	Female students and students from a higher SES obtained more EC, but did not have a higher GPA. Majority students obtained more EC and had a higher GPA than minority students.
25	Stegers-Jager, Cohen-Schotanus, Themmen (2012)	Netherlands / University / Medicine	Path analysis	GPA	*Motivation*: intrinsic goal orientation, task value, self-efficacy *Learning strategies:* elaboration, organisation, metacognition, time management, effort regulation *Engagement*: lecture attendance, tutorial attendance, completion of study assignments	Intrinsic goal orientation, task value, and self-efficacy were positively related to GPA. All cognitive and metacognitive strategies except organisation were positively related to GPA.
26	Suhre, Jansen, & Harskamp (2007)	Netherlands / University / Law	Path analysis	EC Persistence	*Ability*: secondary school GPA *Motivation*: study motivation *Psychosocial*: degree programme satisfaction, perception of faculty contacts *Engagement:* regular study behaviour, tutorial attendance	Secondary school GPA, study motivation, degree programme satisfaction, regular study behaviour, and tutorial attendance all influenced a student's number of obtained credits and persistence. Degree programme satisfaction, tutorial attendance, and regular study behaviour mattered most.

Table I (continued) Overview of the characteristics and main results of the included studies

Ref. nr.	Author (year)	Country / Level of education / Degree programme	Analysis	Outcome variables	Category: independent variables used in the study	Main findings (pertaining to the review)
27	Suhre, Jansen, & Torenbeek (2013)	Netherlands / University / Law	Path analysis	GPA first semester	*Ability*: secondary school GPA *Motivation*: fear of failure, goal-setting *Learning environment*: perceived degree programme organization, perceived transparency of examinations, perceived orientation quality	First semester GPA was positively related to secondary school GPA, goal setting, perceived degree programme organisation, and perceived transparency of examinations. Fear of failure was negatively related to first semester GPA.
28	Te Wierik, Beishuizen, & Van Os (2015)	Netherlands / Professional education / Several programmes	T-test, regression	EC	*Prior education:* level of prior education *Learning environment*: career guidance	The cohort that had career guidance implemented in the curriculum obtained more credits than previous cohorts who did not. Level of prior education also predicted EC.
29	Torenbeek, Jansen, & Hofman (2009)	Netherlands / University / Several programmes	Path analysis	EC	*Ability:* secondary school GPA *Learning environment*: perceived fit between secondary and university education	More satisfaction with the fit between secondary and university education had a positive effect on EC. Secondary school GPA influenced the satisfaction with the fit and EC.
30	Torenbeek, Jansen, & Hofman (2010)	Netherlands / University / Several programmes	Path analysis	EC	*Ability:* secondary school GPA *Demographic:* gender, employment *Motivation*: motivation *Learning environment*: resemblance teaching and learning environment school and university, expectations of and orientation to university education *Psychosocial*: contact with teachers, contact with students, adjustment *Engagement*: class attendance, self-study time	EC was affected by secondary school GPA, class attendance and self-study time. Motivation influenced attendance and study time positively; employment influenced these factors negatively. Resemblance of the teaching and learning environment in school and university affected attendance and study time positively, and adjustment negatively, i.e., when students perceived the learning environment as similar to that at secondary school, they attended more classes and when they experienced little need for adjusting to university, they spent less time studying.

Table I (continued) Overview of the characteristics and main results of the included studies

Ref. nr.	Author (year)	Country / Level of education / Degree programme	Analysis	Outcome variables	Category: independent variables used in the study	Main findings (pertaining to the review)
31	Torenbeek, Jansen, & Hofman (2011a)	Netherlands / University / Several programmes	MANCOVA	EC	*Ability:* secondary school GPA *Learning environment*: teaching approach at secondary school (strong teacher control, moderate teacher control, shared control)	Secondary school GPA was a strong predictor of EC. In the humanities and social sciences programmes, secondary school GPA also predicted the perceived fit. In the humanities and social sciences, students from secondary schools with strong teacher control obtained more EC.
32	Torenbeek, Jansen, & Hofman (2011b)	Netherlands / University / Several programmes	Path analysis	EC	*Ability:* secondary school GPA *Learning environment*: student-centeredness of teaching approach, basic skills development, collaboration skills development, higher order skills development, perceived fit between secondary and university education	EC was positively influenced by secondary school GPA, the perceived fit, and teaching approach (a higher secondary school GPA, being more satisfied with the fit, and more student-centered teaching led to more credits). The perceived fit was positively affected by secondary school GPA and attention to basic and collaboration skills. The perceived fit was affected negatively by teaching approach and higher order skills, i.e., more student-centered teaching and more attention to higher order skills led to less satisfaction with the fit.
33	Torenbeek, Jansen, & Hofman (2011c)	Netherlands / University / Several programmes	Regression	EC	*Ability:* secondary school GPA *Demographic:* gender *Learning environment*: type of fit secondary and university education (less student-centered at university, match, more student-centered, much more student-centered)	Secondary school GPA was positively related to EC. Less student-centered teaching at university was negatively related to EC; more student-centered teaching was positively related to EC. A comparable approach at secondary school and university and much more student-centered teaching at university were unrelated to EC.

Table I (continued) Overview of the characteristics and main results of the included studies

Ref. nr.	Author (year)	Country / Level of education / Degree programme	Analysis	Outcome variables	Category: independent variables used in the study	Main findings (pertaining to the review)
34	Van Bragt, Bakx, Bergen, & Croon (2010)	Netherlands / Professional education / Several programmes	Regression	EC Persistence	*Demographic:* gender *Prior education:* prior education *Personality*: extraversion, agreeableness, conscientiousness, emotional stability, autonomy *Learning strategies*: personal orientations on learning (constructive self-regulation, reproductive external regulation, ambivalence and lack of regulation), study approach (meaningful integrative approach, superficial approach)	Women earned more credits and continued their studies more often than men. Conscientiousness was positively related to credit obtainment, and persistence and ambivalence and lack of regulation negatively.
35	Van Soom & Donche (2014)	Flanders / University / STEM programmes	Cluster analysis, ANOVA	EC GPA first semester	*Ability:* secondary school GPA *Demographic:* gender *Prior education:* secondary school study track *Motivation*: autonomous motivation, controlled motivation, academic self-concept	Secondary school GPA, autonomous motivation, and academic self-concept were positively related to GPA and EC. Female students and students from a traditional secondary school track (i.e., with more focus on science and classical languages) had higher GPAs and obtained more credits.
36	Vanthournout, Gijbels, Coertjens, Donche, & Van Petegem (2012)	Flanders / Professional education / Teacher Education	Regression, path analysis	EC Persistence	*Demographic:* gender *Motivation*: autonomous motivation, controlled motivation, amotivation *Learning strategies*: processing strategies (relating and structuring, critical processing, analyzing, memorizing, concrete processing), regulation strategies (self-regulation, external regulation, lack of regulation)	Amotivation was the only motivational factor that was related to persistence and EC. There was a marginal effect of lack of regulation on persistence. Relating and structuring, lack of regulation, and external regulation were related to EC.

Table I (continued) Overview of the characteristics and main results of the included studies

Ref. nr.	Author (year)	Country / Level of education / Degree programme	Analysis	Outcome variables	Category: independent variables used in the study	Main findings (pertaining to the review)
37	Vermunt (2005)	Netherlands / University / Several programmes	Correlation	GPA first semester	*Demographic:* age, gender *Prior education:* highest level of completed prior education *Motivation*: learning orientations (personally interested, certificate-oriented, self-test oriented, vocation-oriented, ambivalent) *Learning strategies*: processing strategies (relating and structuring, critical processing, memorising and rehearsing, analysing, concrete processing), regulation strategies (self-regulation, external regulation, lack of regulation), conceptions of learning (construction of knowledge, intake of knowledge, use of knowledge, stimulating education, co-operative learning)	Meaning-directed learning was positively associated with GPA and reproduction-directed and undirected learning negatively. Application-directed learning was not clearly related to GPA. Self-regulation was positively related to GPA, and external regulation and lack of regulation negatively. Relations between learning strategies and conceptions and GPA differed in different disciplines.
38	Visser, Korthagen, & Schoonenboom (2015)	Netherlands / Professional education / Teacher Education	Path analysis	EC	*Personality:* procrastination *Motivation*: attributional style, self-efficacy, dispositional optimism, self-esteem, lack of motivation, fear of failure	EC was influenced by self-efficacy (positively), procrastination, and self-esteem (negatively). Lack of motivation and fear of failure influenced procrastination.

Tables II Positive (+), negative (-), and non-significant (NS) relationships with the three student success outcomes in each of the two countries and at each of the two levels of higher education

Table II.1 Ability

Variable (*n* Dutch and Flemish studies)	**Level (*n* studies)**	**Dutch studies**			**Flemish studies**			**Total positive, negative, and non-significant relationships per variable and level**
		GPA	Credits	Persistence	GPA	Credits	Persistence	
Secondary school GPA (14D; 2F)	Prof (0)							
	Uni (16)	5+	10+	3+	2+	2+	1+	23+
Secondary school mathematics GPA (2D)	Prof (0)							
	Uni (2)	1+	2+	1+				4+
Intelligence (1D; 1F)*	Prof (1)						1NS	1NS
	Uni (2)	1+	1+				1NS	2+; 1NS
Total positive, negative, and non-significant relationships per country and outcome		7+	13+	4+	2+	2+	1+; 2NS	
Total per country		24+			5+; 2NS			29+; 2NS

**When studies had a sample that consisted of both professional and university education students, their results were counted in both the professional and university results row.*

Table II.2 Demographic factors

Variable (*n* Dutch and Flemish studies)	Level (*n* studies)	Dutch studies			Flemish studies			Total positive, negative, and non-significant relationships per variable and level
		GPA	Credits	Persistence	GPA	Credits	Persistence	
Gender: female (11D; 6F)*	Prof (6)		4+	2+		1+	2+	9+
	Uni (12)	3NS	2+; 5NS	NS	1+; 1NS	1+; 1NS	2+; 2NS	6+; 13NS
Age (4D)	Prof (1)		1NS					1NS
	Uni (3)	1NS; 1-	1NS; 2-					2NS; 3-
SES (2D; 2F)	Prof (0)							
	Uni (4)	2NS	1+		1+	1+	1+; 1NS	4+; 3NS
Nationality: majority (3D)	Prof (0)							
	Uni (3)	1+; 1NS	2+; 1NS					3+; 2NS
Total positive, negative, and non-significant relationships per country and outcome		1+; 7NS; 1-	9+; 8NS; 2-	2+; 1NS	2+; 1NS	3+; 1NS	5+; 3NS	
Total per country		12+; 16NS; 3-			10+; 5NS			22+; 21NS; 3-

**When studies had a sample that consisted of both professional and university education students, their results were counted in both the professional and university results row.*

Table II.3 Prior education

Variable (*n* Dutch and Flemish studies)	Level *n* studies)	Dutch studies			Flemish studies			Total positive, negative, and non-significant relationships per variable and level
		GPA	Credits	Persistence	GPA	Credits	Persistence	
Level of prior education (5D; 1F)	Prof (4)		2+; 2NS	1NS			1+	3+; 3NS
	Uni (2)	1+	1+					2+
Secondary school track (science) (2D; 2F)	Prof (0)							
	Uni (4)	2+	2+	1+	1+	1+	1+	8+
Secondary school hours of mathematics (3F)	Prof (0)							
	Uni (3)				1+	1+	3+	5+
Secondary school hours of classical languages (3F)	Prof (0)							
	Uni (3)				2+	2+	3+	7+
Total positive, negative, and non-significant relationships per country and outcome		3+	5+; 2NS	1+; 1NS	4+	4+	8+	
Total per country		9+; 3NS			16+			25+; 3NS

Table II.4 Personality characteristics

Variable (*n* Dutch and Flemish studies)	Level (*n* studies)	Dutch studies			Flemish studies			Total positive, negative, and non-significant relationships per variable and level
		GPA	Credits	Persistence	GPA	Credits	Persistence	
Agreeableness (2D; 1F)	Prof (2)		1NS	1NS		1+		1+; 2NS
	Uni (1)	1NS	1NS					2NS
Conscientiousness (2D; 1F)	Prof (2)		1+	1+		1+		3+
	Uni (1)	1+	1NS					1+; 1NS
Extraversion (2D; 1F)	Prof (2)		1NS	1NS		1NS		3NS
	Uni (1)	1-	1NS					1NS; 1-
Neuroticism (2D; 1F)	Prof (2)		1NS	1NS		1+		1+; 2NS
	Uni (1)		1+					1+
Openness (2D; 1F)	Prof (2)		1NS	1NS		1NS		3NS
	Uni (1)	1-	1-					2-
Procrastination (2D)	Prof (1)		1-					1-
	Uni (1)		1-					1-
Total positive, negative, and non-significant relationships per country and outcome		1+; 1NS; 2-	2+; 7NS; 3-	1+; 4NS		3+; 2NS		
Total per country		4+; 12NS; 5-			3+; 2NS			7+; 14NS; 5-

Table II.5 Motivational factors

Variable (*n* Dutch and Flemish studies)	Level (*n* studies)	Dutch studies			Flemish studies			Total positive, negative, and non-significant relationships per variable and level
		GPA	Credits	Persistence	GPA	Credits	Persistence	
Self-efficacy (2D; 2F)	Prof (2)		1+			1+		2+
	Uni (2)	1+			1+			2+
Self-concept (3F)	Prof (0)							
	Uni (3)				3+	1+	1+	5+
Fear of failure (2D)	Prof (1)		1-					1-
	Uni (1)	1-						1-
Intrinsic motivation (2D; 4F)	Prof (1)					1NS	1NS	2NS
	Uni (5)	1+	2+	1+	3+	3+	2NS	10+; 2NS
Extrinsic motivation (2D; 2F)	Prof (1)					1NS	1NS	2NS
	Uni (3)	1NS	2NS	1NS	1NS	1NS		6NS
Motivation to study (4D; 1F)	Prof (1)					1+		1+
	Uni (4)		3+; 1NS	2+; 1NS				5+; 2NS
Extracurricular motivation (2D)	Prof (0)							
	Uni (2)	1-	2NS	1NS				3NS; 1-
Lack of motivation (1D; 1F)	Prof (2)		1-			1-	1-	3-
	Uni (0)							
Expectancies (3D)	Prof (0)							
	Uni (3)	2+	1+					3+
Values (4D)	Prof (0)							
	Uni (4)	1+; 1NS	1+; 1NS					2+; 2NS
Affects (2D)	Prof (0)							
	Uni (2)	1NS	1+					1+; 1NS
Total positive, negative, and non-significant relationships per country and outcome		5+; 3NS; 2-	9+; 6NS; 2-	3+; 3NS	7+; 1NS	6+; 3NS; 1-	1+; 4NS; 1-	
Total per country		17+; 12NS; 4-			14+; 8NS; 2-			31+; 20NS; 6-

Table II.6 Learning environment

Variable (*n* Dutch and Flemish studies)	Level (*n* studies)	Dutch studies			Flemish studies			Total positive, negative, and non-significant relationships per variable and level
		GPA	Credits	Persistence	GPA	Credits	Persistence	
Number of contact hours (3D)	Prof (1)		1+					1+
	Uni (2)	2+						2+
Study load (2D)	Prof (0)							
	Uni (2)	2-						2-
Quality of assessment (2D)	Prof (0)							
	Uni (2)	2+						2+
Quality of organisation (2D)	Prof (0)							
	Uni (2)	1+; 1NS						1+; 1NS
Student-centered learning environment (3D)	Prof (0)							
	Uni (3)		2+; 1NS					2+; 1NS
Perceived fit between school and university (2D)	Prof (0)							
	Uni (2)		2+					2+
Resemblance learning environment school and university (2D)	Prof (0)							
	Uni (2)		1+; 1NS					1+; 1NS
Learning skills preparation in school (2D)	Prof (1)		1-					1-
	Uni (1)		1+	1NS				1+; 1NS
Total positive, negative, and non-significant relationships per country and outcome		5+; 1NS; 2-	7+; 2NS; 1-	1NS				
Total per country		12+; 4NS; 3-						12+; 4NS; 3-

Table II.7 Psychosocial factors

Variable (*n* Dutch and Flemish studies)	Level (*n* studies)	Dutch studies			Flemish studies			Total positive, negative, and non-significant relationships per variable and level
		GPA	Credits	Persistence	GPA	Credits	Persistence	
Academic adjustment (1D; 2F)*	Prof (1)						1+	1+
	Uni (3)	1+	1+		1NS		1+	3+; 1NS
Social adjustment (1D; 1F)	Prof (0)							
	Uni (2)	1NS	1NS		1NS		1+	1+; 3NS
Personal-emotional adjustment (1D; 1F)	Prof (0)							
	Uni (2)	1NS	1+		1NS		1+	2+; 2NS
Institutional attachment (1D; 1F)	Prof (0)							
	Uni (2)	1+	1+		1NS		1+	3+; 1NS
Degree programme satisfaction (2D)	Prof (0)							
	Uni (2)		2+	2+				4+
Total positive, negative, and non-significant relationships per country and outcome		2+; 2NS	5+; 1NS	2+	4NS		5+	
Total per country*		9+; 3NS			5+; 4NS			14+; 7NS

**When studies had a sample that consisted of both professional and university education students, their results were counted in both the professional and university results row.*

Table II.8 Learning strategies

Variable (*n* Dutch and Flemish studies)	Level (*n* studies)	Dutch studies			Flemish studies			Total positive, negative, and non-significant relationships per variable and level
		GPA	Credits	Persistence	GPA	Credits	Persistence	
Self-regulation (4D; 1F)	Prof (2)		1NS	1NS		1NS	1NS	4NS
	Uni (3)	1+	1+	1NS				2+; 1NS
External regulation (2D; 1F)	Prof (2)		1NS	1NS		1+	1NS	1+; 3NS
	Uni (1)	1-						1-
Lack of regulation (2D; 1F)	Prof (2)		1-	1-		1-	1-	4-
	Uni (1)	1-						1-
Deep learning (3D; 1F)	Prof (1)		1NS	1NS				2NS
	Uni (3)		2NS		1NS			3NS
Relating and structuring (1D; 1F)	Prof (1)					1+	1NS	1+; 1NS
	Uni (1)	1+						1+
Critical processing (1D; 1F)	Prof (1)					1NS	1NS	2NS
	Uni (1)	1+						1+
Analysing (1D; 1F)	Prof (1)					1NS	1+	1+; 1NS
	Uni (1)	1NS						1NS
Surface learning (1D; 1F)	Prof (1)		1NS	1NS				2NS
	Uni (1)				1-			1-
Memorising (1D; 1F)	Prof (1)					1NS	1NS	2NS
	Uni (1)	1NS						1NS
Concrete processing (1D; 1F)	Prof (1)					1NS	1NS	2NS
	Uni (1)	1+						1+
Conception of learning as knowledge construction (2D)	Prof (0)							
	Uni (2)	1+		1NS				1+; 1NS

Table II.8 (continued) Learning strategies

Variable (*n* Dutch and Flemish studies)	Level (*n* studies)	Dutch studies			Flemish studies			Total positive, negative, and non-significant relationships per variable and level
		GPA	Credits	Persistence	GPA	Credits	Persistence	
Conception of learning as cooperative (2D)	Prof (0)							
	Uni (2)	1-		1NS				1NS; 1-
Total positive, negative, and non-significant relationships per country and outcome		5+; 2NS; 3-	1+; 6NS; 1-	7NS; 1-	1NS; 1-	2+; 5NS; 1-	1+; 6NS; 1-	
Total per country		6+; 15NS; 5-			3+; 12NS; 3-			9+; 27NS; 8-

Table II.9 Engagement factors

Variable (*n* Dutch and Flemish studies)	Level (*n* studies)	Dutch studies			Flemish studies			Total positive, negative, and non-significant relationships per variable and level
		GPA	Credits	Persistence	GPA	Credits	Persistence	
Lecture attendance (2D)	Prof (0)							
	Uni (2)	1+	1+					2+
Tutorial attendance (3D)	Prof (0)							
	Uni (3)	1+	2+	3+				6+
Observed learning activities (2D)	Prof (0)							
	Uni (2)	1+	1+	1+				3+
Regular study behaviour (2D)	Prof (0)							
	Uni (2)		1+; 1NS	2+				3+; 1NS
Self-study time (4D)	Prof (1)		1+					1+
	Uni (3)	1+	1+; 1NS	1+				3+; 1NS
Total positive, negative, and non-significant relationships per country and outcome		4+	7+; 2NS	7+				
Total per country		18+; 2NS						18+; 2NS

CHAPTER 4

Factors that contribute to secondary school students' self-efficacy in being a successful university student

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Abstract

Academic self-efficacy is a crucial predictor of first-year university students' success, which makes it a key intended outcome of pre-university education. Students with high academic self-efficacy at the end of secondary education likely experience a better transition to university. This study aimed to investigate which factors relate to secondary school students' self-efficacy in terms of being a successful university student, including a personality variable (need for cognition), a motivational variable (academic interest), and two behavioural variables (behavioural engagement and out-of-school academic activities). Structural equation models of data collected in grades 10 and 11 at five schools served to test the proposed model. The results revealed that need for cognition, academic interest, and out-of-school academic activities related directly to self-efficacy. Need for cognition and academic interest were especially pertinent. Behavioural engagement was not related to self-efficacy, showing that personality and motivation were more important in determining self-efficacy than actual behaviour. Background factors played a role: Female students, students taking humanities and social sciences coursework, and students without university-educated parents had lower need for cognition or academic interest, and thus may have lower confidence in themselves being successful in university. By focusing on improving students' need for cognition and academic interest, secondary school teachers can contribute to the development of students' academic self-efficacy and thereby increase their chances for a successful transition to university.

4.1 Introduction

In countries that are part of the Organisation for Economic Co-operation and Development (OECD), on average, one third of all students entering higher education drop out before completion of their study programme (OECD, 2013). The first-year university dropout rate in the Netherlands, where the present study was conducted, is similarly high: In 2012-2013, 33% of university students did not continue on to the second year of the study programme they had started (Inspectie van het Onderwijs, 2016). The first-year experience of students is crucial for overall academic success in higher education: If a student is successful in the first year of higher education, he or she is more likely to graduate from university (Evans & Morrison, 2011). Therefore, first-year study success in higher education is a well-researched topic. According to two influential, international reviews, in addition to previous achievement and standardised test scores, consistent non-cognitive predictors of achievement in university settings include self-efficacy, achievement motivation, grade goals, and effort regulation (Richardson, Abraham, & Bond, 2012; Robbins et al., 2004). The primary predictors of retention were academic goals, academic-related skills, and self-efficacy (Robbins et al., 2004). Thus, self-efficacy functions as a crucial predictor of study success, impacting both achievement and retention. In their recent review, Honicke and Broadbent (2016) found a moderate correlation between self-efficacy and performance among university students.

Self-efficacy refers to a person's perception of his or her ability to perform adequately in a given situation (Bandura, 1997). Academic self-efficacy in a university setting can be conceptualised as the student's belief that he or she can perform well in university-specific tasks, such as mastering the content of academic textbooks for a test and writing an essay to answer a research question. This construct is generalised (i.e., not related to any specific domain of study) and transferable over different programmes of study in the university (Gore, 2006). Research on academic self-efficacy among first-year university students has shown that even though students' level of self-efficacy is above average in an absolute sense, there is substantial variance, including many students with low levels of self-efficacy (e.g., Chemers, Hu, & Garcia 2001). Institutes for higher education might seek ways to enhance their students' self-efficacy, but it also seems legitimate to ask how secondary education can contribute to students' self-efficacy, even before they make the transition to university. In the Netherlands, the secondary school system is highly differentiated; the highest level, pre-university, aims to

prepare students for university. In this sense, an important goal of pre-university education should be to contribute to students' self-efficacy, or their confidence about 'making it' at university, to help prepare them well for university education.

In addition to being a predictor of achievement and retention, self-efficacy has been linked to characteristics that may help students cope effectively with challenges, such as the transition from secondary to university education. Students who are highly self-efficacious exert more effort and persevere in their learning, show higher levels of intrinsic motivation, are better at regulating their learning processes, undertake more challenging tasks, are more likely to adopt a mastery approach to learning, experience less stress in demanding situations, and adjust better in new learning situations (Bassi, Steca, & Delle Fave, 2010; Bong, 1997; Caraway, Tucker, Reinke, & Hall, 2003; Chemers, Hu, & Garcia, 2001; Geitz, Joosten-Ten Brinke, & Kirschner 2016). The last two aspects in particular are extremely important in the transition from secondary education to university, which is stressful for many first-year students and during which the level of adjustment influences achievement (Germeijs & Verschueren, 2007). Chemers, Hu, and Garcia (2001) found that self-efficacy in the first year in higher education relates strongly to adjustment, even after controlling for secondary school GPA. Thus, "confidence in one's relevant abilities (i.e., self-efficacy) plays a major role in an individual's successful negotiation of challenging life transitions" (Chemers, Hu, & Garcia, 2001, p. 55), and academic self-efficacy represents a crucial determinant of a successful transition from secondary school to university. Accordingly, students' self-efficacy already should be high, even before they start their university studies, rather than waiting for first-year programmes to take measures to raise students' self-efficacy after they have started.

Therefore, we sought insights into which personality, motivational, and behavioural variables might influence secondary school students' self-efficacy regarding being a successful student in university. The personality variable we tested was need for cognition; the motivational variable was academic interest; and the two behavioural variables were out-of-school academic activities and behavioural engagement – all variables that likely relate to self-efficacy (e.g., Chen et al., 2016; Elias & Loomis, 2002; Marks, 2000). These variables also are generally amenable to change, so secondary school teachers arguably could address them (Hidi & Renninger, 2006; Linnenbrink & Pintrich, 2003). To the best of our knowledge, no previous research has investigated secondary school students' self-efficacy with regard to being a successful university student.

4.2 Literature review

4.2.1 Need for cognition

Need for cognition is "an individual's tendency to engage in and enjoy effortful cognitive endeavours" (Cacioppo, Petty, Feinstein, & Jarvis, 1996, p. 197). Cacioppo et al. (1996) categorise it as a personality variable. An important difference between individuals high in need for cognition and those low in need for cognition is that the former are more likely to try to make sense of (difficult) information themselves, actively acquire information, and think about and reflect on things, whereas the latter rely on others or external cues to provide information and the structure to make sense of it. Notably, a key difference between the secondary school learning environment and the university learning environment is the level of structure provided. At university, students are expected to be independent learners who manage their own learning process and tackle difficult information by themselves. High need for cognition students thus may be more confident in their ability to study independently and have more confidence in their success at university. As Elias and Loomis (2002) have shown, need for cognition increases students' academic self-efficacy beliefs. Therefore, in our model, we used need for cognition as a personality factor that affects academic self-efficacy directly, as well as indirectly through out-of-school academic activities, academic interest, and engagement – variables we describe subsequently.

4.2.2 Academic interest

Hidi and Renninger (2006, 112) suggested that interest is a motivational variable that "refers to the psychological state of engaging or the predisposition to re-engage with particular classes of objects, events, or ideas over time"; Schunk, Pintrich, and Meece (2008, p. 210) defined interest as "people's liking and willful engagement in an activity". These definitions stem from person-object theory, which states that interest emerges from a person's interaction with the environment or an object, which is not necessarily tangible and thus can refer to a topic, idea, activity, or subject matter (Hidi & Renninger, 2006). Research has revealed a relationship between interest and self-efficacy, though there is some disagreement about the direction of this relationship: Does self-efficacy precede interest, or is the relationship reciprocal? Some evidence implies that interest influences self-efficacy (Chen et al., 2016), which Hidi (2006) explained by noting that self-efficacy grows through the pursuit of interest-driven activities that invoke positive affect.

Interest often appears as a subject-specific construct (i.e., interest in history or mathematics), but it also can be defined more generally, encompassing collections of related subjects and topics (cf. 'general interest in school'; Wentzel, 1998). We adopted this generalized view to focus on individual interest (i.e., liking, engaging with, and being predisposed to reengage) in gaining academic knowledge in a chosen field and its research-based activities. For expediency, we refer to this construct as 'academic interest'. This broad version of academic interest is especially appropriate for pre-university education, which involves students with high ability levels who aim to be the future generations of scholars. We expected academic interest to function similarly to interest in a specific subject or topic: Greater interest leads to more self-efficacy.

4.2.3 Behavioural engagement

Behavioural engagement is part of the broader construct of student engagement, which refers to involvement in and commitment to school (Landis & Reschly, 2013). Behavioural engagement comprises indicators such as attendance, participation, and preparation (Christenson, Stout, & Pohl, 2012; Fredricks, Blumenfeld, & Paris, 2004). Linnenbrink and Pintrich (2003) found a consistent, stable relationship between self-efficacy and behavioural engagement, implying a directional link from self-efficacy to engagement, though they also cautioned that the relationship might be reciprocal: "The more a student is engaged, and especially the more they learn and the better they perform, the higher their self-efficacy" (Linnenbrink & Pintrich, 2003, 123). Therefore, we proposed that behavioural engagement influences academic self-efficacy.

4.2.4 Out-of-school academic activities

Behavioural engagement focuses specifically on school-related activities (e.g., homework, studying for tests). Need for cognition is a personality construct that implies that students are curious, but it may not necessarily lead to students acting on that curiosity. Students who intend to go to university not only require need for cognition but also must act on this need by performing self-initiated academic activities outside of school. Such informal out-of-school academic activities might include reading the research section on a popular news website, talking to friends or family about academic knowledge, or watching enquiry-based documentaries. Secondary school students who perform such out-of-school academic activities likely become more acquainted with the world of academia and the enquiry-

based way of thinking and therefore may be more self-efficacious regarding their university studies. Little research has addressed this type of activity specifically, so we included this variable as an exploratory construct and investigated whether it would affect students' academic self-efficacy.

4.2.5 Background variables

We included three background variables in this study: gender, parental educational level, and type of coursework. The rationales for including them were either that prior research has linked them to the measured constructs or because little research has addressed the relationship between a specific background factor and a measured construct, and we sought to examine this relationship.

Gender

No consistent gender differences in self-efficacy have appeared in previous research (Choi, 2005; Hampton & Mason, 2003), but gender seems to influence one of the intermediate variables that may lead to academic self-efficacy; research consistently showed that girls are more engaged in school than boys (Lam et al., 2012; Marks, 2000). Regarding need for cognition, Cacioppo et al.'s (1996) review of individual differences indicated no gender differences in total scores on the need for cognition scale. Regarding academic interest and out-of-school academic activities, we found no research on gender differences. Thus, we had no specific expectations regarding gender differences in these factors.

Parental educational level

Parents' cultural capital influences their children's academic achievement (Jaeger 2011). Parents with higher educational levels create more stimulating home environments and interact more with their children around learning activities (De Graaf, De Graaf, & Kraaykamp, 2000; Eccles, 2005). According to the parent socialisation model, these influences enhance children's engagement in educational activities, as demonstrated empirically by Davis-Kean (2005). Therefore, parental educational levels could be related to both engagement and academic out-of-school activities. Moreover, in line with Bourdieu's cultural and social capital theory, parents who have attended university themselves should be more familiar with university-level learning and thinking and foster similar kinds of learning and thinking in their children (Devlin, 2013). Hence, the parents' educational level could influence students' need for cognition and academic interest.

Humanities/social sciences versus science coursework

Little research has described the potential influence of a student's coursework – such as whether it is focused mainly on humanities and social sciences or science subjects – on the variables in our model. Students in Dutch secondary education must choose between subjects that focus on humanities and social sciences or natural sciences, which provided us with an opportunity to explore whether these students would differ in their need for cognition, out-of-school academic activities, academic interest, engagement, or self-efficacy.

4.2.6 Aims and research question

Figure 4.1 depicts our proposed model, with all the constructs and variables that we expected to relate to self-efficacy in university studies. We do not offer specific hypotheses regarding the background variables, because past research has not provided conclusive guidelines regarding whether to expect certain pathways. Consequently, we investigated the roles played by background variables in an exploratory fashion.

As our main research questions, we asked: What is the relative importance of need for cognition, academic interest, behavioural engagement, and out-of-school academic activities in terms of influencing students' self-efficacy for being a successful university student? How much influence is exerted by background variables, including gender, level of parental education, and taking science or humanities/social sciences coursework in secondary school?

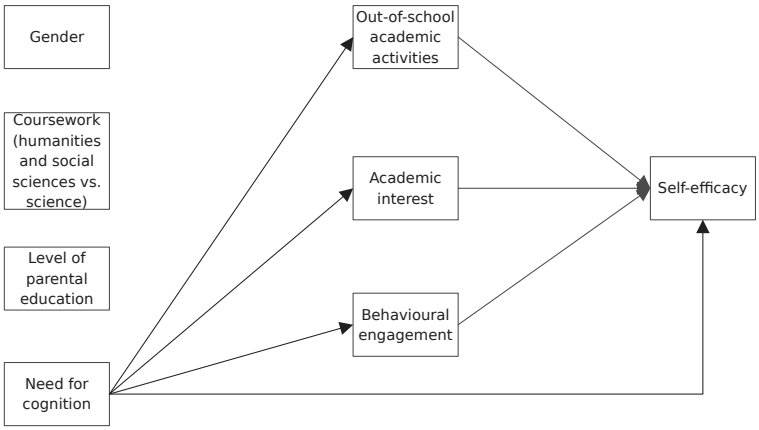

Figure 4.1 Theoretical model: Factors influencing self-efficacy

Note: There are no pathways hypothesised from the background variables. Based on exploratory analyses, pathways from these variables will be added and tested.

4.3 Method

4.3.1 Context

We conducted this study in the Netherlands, where the secondary education system is relatively differentiated. After eight years of primary education, students enter a specific secondary education channel, according to their abilities, tested at the end of their primary education. The highest level of secondary education is pre-university education, attended by approximately 17 per cent of Dutch adolescents (Centraal Bureau voor de Statistiek (CBS), 2012). Graduating from pre-university grants students direct entrance into university education. About 80 per cent of pre-university students enter university after graduation (CBS, 2016). The other levels of secondary education are general secondary education and vocational secondary education, graduating from which grants students access to professional higher education or vocational education, respectively. Depending on the field of study, there are alternative pathways to university, such as graduating from professional higher education.

Because pre-university grants direct access to the university track, next to preparing students for their final examinations, university preparation is the central goal for this education stream. In grades 10 through 12, Dutch pre-university education students undertake either science coursework (e.g., biology, chemistry, physics, advanced mathematics) or humanities and social sciences coursework (e.g., history, geography, modern languages, economics), in addition to subjects that are obligatory for all students (e.g., Dutch, English). The variance in pre-university students' cognitive capacities is relatively low, which is why we focus on personality, motivational, and behavioural aspects.

We collected data from grade 10 and 11 students at the end of the school year, so most of the students would be attending university in two or one years, respectively, from the moment of data collection. All of these students had started with the mandatory career orientation programme, so they should be able to make a reasonable estimate of their self-efficacy regarding university skills and their academic interest, including their feelings about gaining academic knowledge and their interest in research. The survey clearly described the required university study skills, which are related to pre-university study skills, involving general skills such as planning, organising, text reading, and essay writing. Therefore, the student participants should be able to estimate their efficacy in university-level study skills.

4.3.2 Sample

Eight secondary schools in different geographical regions in the Netherlands were contacted to determine their interest in participating in our research on self-efficacy related to university preparation. Five schools were willing to do so. From these schools, 759 pre-university students in grades 10 and 11 completed two questionnaires that measured the variables of interest, after we had obtained parental consent (22 students were ill at the time of data gathering, and three students did not have parental consent to participate). The sample was balanced in gender (50.5% girls) and grades (51.9% grade 10). A small majority of students (54.9%) did science coursework; the other students took humanities/social sciences coursework. Of all Dutch pre-university students, 53% are female and 60% undertake science coursework (Platform Bèta Techniek, 2014), so our sample reasonably resembles the population. The ages of the participants ranged from 13 years and six months to 20 years and two months, with an average age of 16 years and nine months. We also asked students if one or both of their parents had attended university; most of them indicated that neither parent had attended university (65.4%), 21.3% of students noted that one parent was educated at a university level, and 13.3% had two university-educated parents.

4.3.3 Measures

Need for cognition was measured with the efficient version of the Need for Cognition Scale by Cacioppo, Petty, and Kao (1984), using an 18-item 5-point Likert questionnaire. Sample items included, "I would prefer simple to complex problems" and "Thinking is not my idea of fun" (both reverse-coded). This questionnaire was translated into Dutch, using a back-translation procedure. Previous research affirmed that this scale consists of one factor and has good internal consistency (Sadowski, 1993). Similarly, we found $\alpha = .83$.

Academic interest was defined as a desire to gain academic knowledge in one's field of interest and to conduct research-based activities because the person finds it inherently interesting or enjoyable. The items were based on the Scientific Attitude Inventory II (SAI II; Moore & Foy, 1997). Academic interest was measured with six items, after removing redundant items, identified in a pilot test. Sample items were "I like the idea of gaining academic knowledge in the field of my interest" and "I hope to one day get a job that includes doing research". To ensure the items were not skewed in the favour of people who were interested in pursuing a science career, as opposed to students with humanities or social

sciences interests, we avoided mentioning specific disciplines and emphasised that this section of questions focused on general academic interest, regardless of the field. Students had to answer on a 4-point Likert-scale (1 = 'completely disagree'; 4 = 'completely agree'). The academic interest scale was highly internally consistent (α = .87).

In line with prior literature, we developed a questionnaire with three components of *student engagement*: behavioural, cognitive, and emotional. These three components were measured with self-reported questions on a 5-point Likert scale (1 = 'does not describe me at all'; 5 = 'describes me very well'). We took the items from existing instruments that measured components of student engagement, such as the Student Engagement Instrument (Appleton, Christenson, Kim, & Reschly, 2006), the Student Engagement in Schools Questionnaire (Hart, Stewart, & Jimerson, 2011), Engagement versus Disaffection with Learning (Skinner, Furrer, Marchand, & Kindermann 2008), and the Identification With School Questionnaire (Voelkl, 1996). To develop our measure of student engagement, we proceeded through three steps. First, we chose items that appeared in multiple existing instruments and that clearly related to behavioural, cognitive, and emotional engagement, then translated them into Dutch with a back-translation procedure, resulting in an initial version of the instrument. Second, we tested this initial version with a small number of students in upper-grade, pre-university classes. Third, we conducted analyses to eliminate any redundant items and establish the psychometric qualities of the instrument. The final version of the instrument consisted of 19 items: eight measuring behavioural engagement (e.g., "I actively participate in class", α = .87), five measuring emotional engagement (e.g., "I enjoy most classes in school", α = .70), and six measuring cognitive engagement (e.g., "In school you learn important things", α = .76). In this study, we only used behavioural engagement.

To measure *out-of-school academic activities*, we used six items, each consisting of an academic-related activity that can be performed at home, such as "Watching television programmes with an academic touch, e.g., documentaries on Discovery Channel or documentaries on psychological topics" or "Reading research news items in the paper or on news websites". Similar to the measure of academic interest, we put effort into ensuring that these items were not skewed in the favour of people with science interests. For example, we included examples of both science and non-science academic activities in the items, as the sample items indicate. Students noted how often they performed each of these activities,

on a scale from 1 ('never') to 5 ('daily'). Pilot testing showed that these items did not need any adaptation. Out-of-school academic activities had sufficient internal consistency (α = .77).

Following Bandura's (1997) definition of self-efficacy, we conceptualised *academic self-efficacy* as the belief a student has in his or her capabilities to organise and execute the courses of action that are required to be a successful university student. The items that we used therefore reflected typical academic skills that students need for their university studies, such as being capable of independent study, understanding difficult subject matter, and being able to write essays (Jansen & Suhre, 2010; Krause, 2001; Lowe & Cook, 2003). Because the participants were still in secondary education, we clearly described the required academic skills and started the question block of academic self-efficacy with an explanation of what studying at university is like. For example, we explained the difference between lectures and seminars, to give the participants the necessary context to answer questions that focused specifically on these settings. After pilot testing and subsequently removing redundant items, six of the original 15 items remained. Students rated their confidence that they would be able to perform these skills successfully on a 4-point Likert-scale (1 = 'not confident at all'; 4 = 'very confident'). Examples included, "Studying three academic books thoroughly for a test" and "Writing an essay on an academic subject in your own field of interest, based on research evidence". This factor achieved an internal consistency of α = .70. All the measures are summarised in Table 4.1.

Table 4.1 Means, standard deviations, number of items, Cronbach's alpha, and minimum and maximum values

			Range			
Variable	*M*	*SD*	Potential	Actual	*n* items	α
Need for cognition	3.42	0.48	1–5	1.67–4.89	18	.83
Academic interest	2.89	0.68	1–4	1.00–4.00	6	.87
Behavioural engagement	3.60	0.78	1–5	1.00–5.00	8	.87
Out-of-school academic activities	2.26	0.73	1–5	1.00–4.57	6	.77
Self-efficacy	2.58	0.48	1–4	1.00–4.00	6	.70

4.3.4 Procedure

The questionnaires were all paper-and-pencil tests, handed to the students during class by the researchers or a teacher who had received instruction. Informed consent from parents was obtained in advance. Students who did not have parental consent to participate (three students out of the whole sample) went to an empty classroom or another place in the school where they did some homework. Participation by students was voluntary and without compensation but strongly encouraged by teachers. None of the students who got consent from his or her parents refused to participate.

4.3.5 Statistical analyses

We sought to determine how well our theoretical model (Figure 4.1) fit the data provided by a sample of Dutch, grade 10 and 11, pre-university students. To avoid including unnecessary pathways from the background variables in the model, we first conducted *t*-tests and an analysis of variance (ANOVA) to test for significant differences in need for cognition, out-of-school academic activities, engagement, academic interest, and self-efficacy, based on gender, coursework, and level of parental education. We also looked at the bivariate correlations across all included factors. After conducting these exploratory analyses, we undertook structural equation modelling (SEM) with the statistical package available in Mplus, Version 7. Regarding the background variables, we only included pathways if we found a significant difference in the *t*-test or ANOVA. For example, if we found a significant difference between boys and girls regarding their need for cognition, we added a pathway from gender to need for cognition. To evaluate the goodness of fit of the models, we considered the ratio of the chi-square to its degrees of freedom (χ^2/df), the root mean square error of approximation (RMSEA), standardised root mean square residual (SRMR), comparative fit index (CFI), and Tucker-Lewis index (TLI), which is less susceptible to sample size (Tucker & Lewis, 1973). With our relatively large sample size ($n > 400$), the *p*-value of the sample size-sensitive chi-square test could be erroneously significant and thus may not adequately reflect whether our model provides a good fit to the data (Schumacker & Lomax, 2004). Following established guidelines, we determined that the model offered an appropriate reflection of the data if the χ^2/df value was less than 3 (Kline, 2005), the RMSEA was less than .07, the SRMR was less than .08, and the CFI and TLI were greater than .90 (Chen, Curran, Bollen, Kirby, & Paxton, 2008; Hu & Bentler, 1999; Kline, 2005; Steiger, 2007; Tucker & Lewis, 1973).

4.4 Results

4.4.1 Preliminary analyses

Table 4.1 contains the descriptive statistics for need for cognition, academic interest, behavioural engagement, out-of-school academic activities, and self-efficacy in being a successful university student. Table 4.2 presents the bivariate correlations among the factors. In Tables 4.3, 4.4, and 4.5 we also present the gender, coursework, and parental education differences, respectively. Substantial gender differences emerged regarding the behavioural variables: Girls were significantly more behaviourally engaged than boys, but boys engaged more in out-of-school academic activities. Small but significant gender differences were found for need for cognition and academic interest, such that boys scored higher on these variables. Boys and girls did not differ in their level of self-efficacy. Regarding coursework, we found a large difference in academic interest and a smaller difference in need for cognition, both in favour of students taking science coursework. Students with two university-educated parents were substantially higher in need for cognition, engaged in more out-of-school academic activities, and were higher in self-efficacy than students whose parents had not attended university. These significant differences were entered as control variables in the path model.

Table 4.2 Bivariate correlations between the factors

	1	2	3	4	5
1. Need for cognition	-	.50**	.18**	.37**	.43**
2. Academic interest		-	.13**	.35**	.42**
3. Behavioural engagement			-	-.08	.04
4. Out-of-school academic activities				-	.32**
5. Self-efficacy					-

* $p < .05$
** $p < .01$

Table 4.3 Gender differences

Variable	*M (SD)* girls	*M (SD)* boys	*t*	*p*	Cohen's *d*
Need for cognition	3.37 (0.48)	3.47 (0.48)	-2.14	.03	.19
Academic interest	2.82 (0.71)	2.95 (0.64)	-2.03	.04	.19
Behavioural engagement	3.90 (0.67)	3.30 (0.77)	8.81	<.01	-.81
Out-of-school academic activities	2.05 (0.69)	2.46 (0.71)	-6.32	<.01	.59
Self-efficacy	2.56 (0.49)	2.61 (0.48)	-1.07	.29	.18

Table 4.4 Coursework differences

Variable	*M (SD)* hum & soc	*M (SD)* science	*t*	*p*	Cohen's *d*
Need for cognition	3.34 (0.49)	3.48 (0.46)	-3.09	<.01	.30
Academic interest	2.67 (0.71)	3.06 (0.61)	-6.42	<.01	.59
Behavioural engagement	3.62 (0.78)	3.60 (0.77)	.22	.82	-.03
Out-of-school academic activities	2.19 (0.73)	2.31 (0.73)	-1.79	.07	.16
Self-efficacy	2.60 (0.48)	2.56 (0.49)	0.85	.40	-.08

Notes: hum & soc = students taking humanities and social sciences coursework; science = students taking science coursework.

Table 4.5 Parental education differences

Variable	*M (SD)* 0	*M (SD)* 1	*M (SD)* 2	*F*	*p*	Cohen's *d*
Need for cognition	3.36 (.50)	3.47 (.44)	3.57 (.44)	5.60	<.01	.45
Academic interest	2.85 (.70)	2.87 (.74)	2.98 (.58)	.94	.39	.20
Behavioural engagement	3.58 (.78)	3.64 (.77)	3.66 (.76)	.37	.69	.10
Out-of-school academic activities	2.17 (.70)	2.29 (.75)	2.51 (.77)	6.50	<.01	.46
Self-efficacy	2.53 (.47)	2.66 (.50)	2.66 (.50)	4.11	.02	.27

Notes: 0 = students whose parents had not attended university; 1 = students for whom 1 of the parents attended university; 2 = students for whom both parents attended university. Cohen's d is the standardised difference between the score of students with zero university-educated parents and students with two university-educated parents.

4.4.2 Path analysis

We first tested our conceptual model, as presented in Figure 4.1, with the effects of the background variables we found in the *t*-tests and ANOVA. This model achieved a good fit: $\chi^2_9 = 17.33$, $p = .04$ ($N = 472$); $\chi^2/df = 1.93$; RMSEA = .04 (90% confidence interval [.01, .08]), SRMR = .02, CFI = .98, and TLI = .95. However, two of the proposed pathways from gender were insignificant: to need for cognition and to academic interest. Moreover, the pathway from parental education to academic self-efficacy was insignificant, as was the pathway from behavioural engagement to academic self-efficacy. Therefore, we tested a second model, with the insignificant pathways removed. Figure 4.2 depicts the path coefficients for the proposed relationships in this model. The goodness-of-fit statistics confirmed that this model fit the data very well: $\chi^2_{12} = 22.12$, $p = .04$ ($N = 472$); $\chi^2/df = 1.84$; RMSEA = .04 (90% confidence interval [.01, .07]), SRMR = .04, CFI = .98, and TLI = .96.

Need for cognition, out-of-school academic activities, and academic interest related to students' academic self-efficacy. Of these variables, need for cognition and academic interest had the greatest impacts (β = .24 (.05) and β

= .26 (.05), respectively), whereas out-of-school academic activities mattered less (β = .14 (.05)). Contrary to expectations, behavioural engagement was not related to academic self-efficacy: Students who were more behaviourally engaged in school did not necessarily have more confidence in their abilities to be a successful university student. We confirmed the hypothesised link from gender to behavioural engagement, such that girls were more engaged in school. The level of education of the parents also significantly influenced need for cognition and the extent of out-of-school academic activities in which a student engaged. The level of education of the parents, however, did not influence a student's behavioural engagement or academic interest. Other links arose between gender and out-of-school academic activities (β = .25 (.04)), between coursework and need for cognition (β = .11 (.05)), and between coursework and academic interest (β = .22 (.04)). Thus, boys were more engaged in out-of-school academic activities and students undertaking science coursework had a higher need for cognition and showed more academic interest.

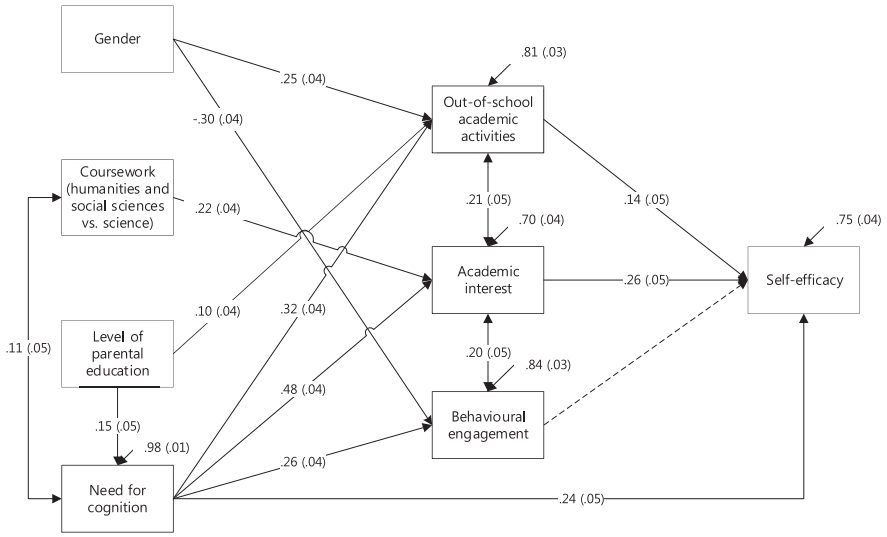

Figure 4.2 Standardised effects (and standard errors) of all factors in the model influencing self-efficacy

Notes: $\chi^2_{12} = 22.12$, $p = .04$ ($N = 472$); $\chi^2/df = 1.84$; RMSEA = .04 (90% confidence interval [.01, .07]), SRMR = .04, CFI = .98, and TLI = .96. *Gender was coded as 0 = female; 1 = male. Parental educational level was coded as 0 = no parent attended university, 1 = one parent attended university, 2 = two parents attended university. Coursework was coded as 0 = humanities/social sciences student; 1 = science student. A dotted line represents a non-significant pathway.*

4.5 Discussion

4.5.1 Discussion of the main findings

Academic self-efficacy is an important predictor of study success in university (Robbins et al., 2004), and it has the potential to help students experience a smooth transition from secondary education to university, in that highly self-efficacious people cope better with difficult situations (Bandura, 1997). By expanding understanding of variables that relate to secondary students' self-efficacy in studying at university, our findings provide relevant insights for Dutch education, as well as for educators in other countries that have an educational track that prepares students specifically for university, such as Germany and Italy. In comprehensive school systems, these results also have value, because they suggest a means for identifying the brightest students, who have the attitudes and corresponding behaviours needed to pursue a university education.

Being self-efficacious provides an important foundation for university success, so it is useful to determine which variables relate to this intended outcome of pre-university education. In this study, we have sought to identify which personality, motivational, behavioural, and background variables relate to secondary school students' self-efficacy with regard to being a successful student in university, so that secondary school educators know where to focus as they work to prepare their students for the transition to university. We found that need for cognition, out-of-school academic activities, and academic interest all affect academic self-efficacy. Background variables also played a role, such that boys performed more out-of-school academic activities than girls, students with science coursework had a higher need for cognition and more academic interest than students with mainly humanities and social sciences coursework, and students whose parents have attended university had a higher need for cognition and performed more out-of-school academic activities. In addition, the results revealed a powerful role of the personality construct need for cognition, which affects self-efficacy directly but also indirectly, by influencing out-of-school academic activities and academic interest. Our findings are in line with previous research that cites a connection between need for cognition and self-efficacy (Elias & Loomis, 2002) and between interest and self-efficacy (Chen et al., 2016).

Out-of-school academic activities also contributed to self-efficacy, likely because students who perform self-initiated, informal academic activities at home become more familiar with the world of academia and therefore feel more

confident that they can thrive in a university environment. Engagement did not significantly influence self-efficacy. The absence of this link was surprising; much research points to the importance of engagement for academic outcomes. By actively engaging in learning activities, students develop knowledge and skills, which enhances their self-efficacy beliefs (Klem & Connell, 2004; Marks, 2000). We also did not find gender differences in self-efficacy, so the absence of a link between engagement and self-efficacy cannot be explained by girls' higher engagement scores.

In this study, students undertaking science coursework exhibited more academic interest than students taking humanities/social sciences subjects, which might be because science classes in secondary school have greater potential to arouse academic interest (i.e., wanting to do research and pursuing knowledge) than humanities and social sciences classes. In biology, physics, and chemistry courses, teachers often use enquiry-based methods, engaging and student-centered instruction, and data analyses of actual research questions, reflecting 'real' academic enquiry (Anderson, 2002; Schroeder, Scott, Tolson, Huang, & Lee, 2007). Science students thus become more familiar with conducting research; humanities and social sciences students might feel left behind or less familiar with the academic opportunities in their field of interest. An alternative (or complementary) explanation may involve self-selection: Students who choose to take on science coursework may, at that moment of choosing (in grade 9), already have more academic interest and therefore choose science subjects because they believe these better match their interests in doing research and gaining academic knowledge. A related point pertains to a widespread stereotype among Dutch students (and parents and teachers) that science subjects are more prestigious, so students choose humanities/social sciences coursework only if they have low grades or are less ambitious (Groot, 2016).

We expected that the level of parental education would influence all variables, but we only found evidence that university-educated parents passed on a need for cognition and a habit of being involved in academic activities outside of school hours to their children. These influences by parental education were rather small. The connections of parental educational level with need for cognition and out-of-school academic activities might have arisen because parents with less education lack the means to foster their children's curiosity and learning (Spera, 2005).

Finally, we found an interesting connection between gender and out-of-school academic activities. Boys, though less engaged in school, were more engaged

in out-of-school academic-related activities, such as looking up news on academic topics on the Internet or reading or watching research-based documentaries. The Internet is becoming a primary medium for informal learning; research also shows that boys spend more time than girls looking up information on the Internet (Vekiri & Chronaki, 2008). Another explanation could be that boys feel less at home in the school learning environment than girls and more often hold negative attitudes and perceptions toward school (Archambault, Janosz, Morizot, & Pagani, 2009), but because they are not less curious, they have a higher tendency than girls to search for information elsewhere, to satisfy their curiosity.

4.5.2 Implications

Implications for theory and research

Much research in the fields of education and psychology focuses on self-efficacy, but insufficient studies specifically investigate the role of self-efficacy beliefs in important transitions in education, such as the transition from secondary school to university (Chemers, Hu, & Garcia, 2001). We have demonstrated that need for cognition, academic out-of-school activities, and academic interest relate to students' academic self-efficacy, but other personality, behavioural, or motivational factors also might increase students' confidence in their ability to be successful university students. It would be worthwhile to establish which factors play a role and develop a more comprehensive model of the pathways to self-efficacy.

Furthermore, the stability of self-efficacy during a transition would be an interesting focus of study. Do students who graduate from pre-university with high levels of self-efficacy maintain these high levels through their first semester at university? On the one hand, the change in their learning environment and its accompanying demands could cause a disruption in students' sense of being competent learners (Christie, Tett, Cree, Hounsell, & McCune, 2008). On the other hand, self-efficacy beliefs should transfer from one context to another, comparable context (Bandura, 1977). The question thus becomes, are the secondary school and university learning environments comparable enough for students who are highly self-efficacious at the end of secondary education to avoid suffering a significant drop in their academic self-efficacy during the difficult transition?

Implications for practice

To raise students' self-efficacy with regard to being a successful university student, teachers could pay attention to enhancing the factors that relate to self-efficacy. Because need for cognition is a stable trait (Cacioppo & Petty, 1982), it might be difficult for teachers to enhance students' need for cognition, though Elias and Loomis (2002) suggest that need for cognition still might be increased by teaching practices, such as making learning tasks enjoyable.

Academic interest also represents an important contributor to self-efficacy. Our results show that students undertaking humanities/social sciences coursework had significantly less academic interest than students doing science coursework, which may lead them to feel less self-efficacious once they enter university. The problem could be that these students are not (sufficiently) aware that disciplines such as modern languages and history are academically grounded and that academic activities, such as research, can be performed in these disciplines. They also might not be familiar with the ways of doing research in these disciplines. Teachers could raise this awareness by discussing important academic theories, interesting recent research findings, and enquiry methods as they relate to these disciplines, as well as requiring students to interact with the content in a more academic way, including research activities. Humanities and social science teachers could adopt the enquiry-based learning approach that is common in science courses, for example. Such practices also may have the positive side effect of disrupting the negative image of the humanities and social sciences as less academically prestigious than science.

Research into methods to trigger, enhance, and maintain interest highlights two main types of interest: situational, which is triggered by the environment and may last for a short period, and individual, or a person's long-lasting predisposition to re-engage with particular content over time. Situational interest always precedes individual interest (Hidi & Renninger, 2006). Therefore, teachers should start by promoting situational interest, such as by creating a learning environment that makes the topic at hand interesting. For example, they should enhance task value by placing knowledge in a context that is relevant to students' daily lives (Krapp & Prenzel, 2011) or emphasising the utility of the content (Osborne, Simon, & Collins, 2003). To trigger students' academic interest specifically, typical academic features should be related clearly to students' lives. The next step is to sustain this interest, so that it can develop into a long-lasting, individual interest. Creating situations that invite students to generate their own questions helps keep them interested (Hidi & Renninger, 2006). Self-determination and a less restrictive learning environment

also are important; Köller, Baumert, and Schnabel (2001) emphasised that a mismatch between the curriculum and students' interests prevents interest from enhancing academic learning. Better matched assignments can increase students' academic interest, as well as provide them with a more representative view of the world of academia and the academic way of thinking, which should enable them to clarify their own academic interests. Furthermore, attractive assignments that trigger students' interest will make them more engaged in their schoolwork, which has positive effects on their academic attitudes and behaviour, as well as their subsequent self-efficacy in being a successful university student.

The extent to which a student engages in self-initiated out-of-school academic activities also influences self-efficacy. To enhance students' extracurricular engagement, especially of girls and students whose parents do not have higher education backgrounds, teachers should make them familiar with the common presence of academic issues, across all subjects and domains of study. Finally, prior research also offers suggestions for directly enhancing self-efficacy, such as providing students with challenging academic tasks that are attainable with effort and fostering the belief that competence can be changed (i.e., a growth mindset) (Linnenbrink & Pintrich, 2003).

4.5.3 Limitations

This study is context-specific; the research was carried out in a pre-university education setting, reflecting a specific track of secondary education in the Netherlands that prepares students for university. In addition, the relationships in this study are correlational. We cannot infer that one variable causes another, and many of the relationships might be turned around. However, our goal was to measure pathways toward academic self-efficacy, instead of using self-efficacy as a predictor, because the measure focused on expected efficacy in university studies, but study participants had not yet entered their university studies. Other variables that were not included in this study may also affect self-efficacy, so further research should include and investigate more variables. Finally, this study mainly focused on student variables, not contextual variables, such as the school environment or teacher practices. The only school variable that we included, coursework, influenced students' academic self-efficacy through its impact on academic interest. Although the knowledge that students doing science coursework have more academic interest provides teachers (especially humanities and social sciences teachers) with important information, more practicable guidelines would require the inclusion of additional school variables.

CHAPTER 5

The relationship between secondary school students' engagement profiles and the transition to university

Based on: Van Rooij, E. C. M., Jansen, E. P. W. A., & Van de Grift, W. J. C. M. (2017). Secondary school students' engagement profiles and their relationship with academic adjustment and achievement in university. *Learning and Individual Differences, 54*, 9-19. DOI 10.1016/j.lindif.2017.01.004.

Abstract

The ability to distinguish secondary school students according to characteristics that contribute to success in university represents important knowledge in the research areas of university readiness and student success in higher education. This study aimed to identify different types of students in the last year of secondary school and to investigate if and how these types differed in academic adjustment and success in university one year later. Latent profile analysis revealed the existence of five distinguishable profiles of secondary school students: intellectually highly disengaged (7%); behaviourally and cognitively disengaged (14%); students with overall average engagement (36%); intellectually engaged (22%); and overall highly engaged students (21%). Male students were overrepresented in groups in which students' intellectual engagement was higher than their behavioural and cognitive engagement. Students doing science coursework were overrepresented in the group of intellectually engaged students and those doing humanities and social sciences coursework were overrepresented in the group of intellectually highly disengaged students. One year later, intellectually highly disengaged students (7%) and students with low behavioural and cognitive engagement (14%) were least successful in university. Students with the highest behavioural and cognitive engagement scores in secondary school adjusted and performed best in university. These results point to the importance of both behavioural and cognitive engagement. Raising these factors in secondary school students could contribute to better preparation for university education.

5.1 Introduction and literature review

To lower university dropout rates, secondary school graduates need to be well-prepared for university education. Since most research on achievement in higher education uses samples of university students it is not very clear what attributes that students already possess in secondary education contribute to success in university. Therefore, in this study we examined the relationship between students' attributes, in this case engagement characteristics, in grade 12 of secondary education and their achievement and adjustment one year later in the first semester of university education.

The transition from secondary school to university is critical; many students drop out or switch majors during or after the first year of university. Dropping out has negative financial and emotional consequences, as well as repercussions for labour market positions. Switching educational majors may seem less problematic, but for many students, this shift means it will take them longer to graduate, which could have significant cost implications. Furthermore, the chances of university success appear dependent mainly on the transition from secondary to higher education (Baker, 2004). The better a student is prepared to take this leap, the less likely he or she will stumble over the challenges of a new study and life environment. In the Netherlands, the secondary education system is highly differentiated. The students who showed the most potential in primary school (as measured by a test and judged by the teachers) can attend the highest level of secondary education: pre-university education. Graduating from pre-university education after six years grants students access to university education. In 2014, 80% of pre-university graduates continued their education in university (CBS [Centraal Bureau voor de Statistiek], 2016).

What student characteristics in secondary school may affect their success in university? Academic achievement can be explained by cognitive (i.e., intelligence) and non-cognitive factors. A broad, non-cognitive factor is student engagement. Broadly, student engagement refers to students' involvement in and commitment to school (Landis & Reschly, 2013). Involvement refers to active participation in academic as well as extracurricular activities. Commitment can be interpreted as commitment to educational goals and learning (Christenson, Reschly, & Wylie, 2012). Student engagement has received much attention in research and practice due to its proven connection to dropout. Lately, the concept has been turned around: Instead of focusing on low engagement leading to

dropout, an increasing number of researchers are emphasizing the importance of high engagement for successful high school completion. As a consequence of this turnaround, engagement research increasingly focused on all students, instead of primarily on the ones that are at risk to drop out. The attractiveness of studying engagement as a useful factor in school improvement lies in the fact that it is an alterable variable, in contrast to (relatively) fixed variables such as socioeconomic status and intelligence (Landis & Reschly, 2013). As Zyngier (2008) pointed out, "While this disengagement might be seen as a problem of the individual student in terms of dropping out or problematic behaviour at school, it can also more appropriately be seen in terms of the school failing to enable the student to achieve their potential" (p. 1767). Originally, student engagement was divided into two elements, following the Participation-Identification (PI) Model introduced by Finn (1989). Participation referred to behavioural engagement and identification involved affective engagement. A decade later, with more researchers entering the field of engagement research, a compartmentalisation into three aspects became more popular. The construct was divided into a behavioural, a cognitive, and an affective (sometimes referred to as psychological or emotional) aspect. According to Fredricks, Blumenfeld, and Paris (2004), behavioural engagement consists of indicators such as positive conduct and rule following including attendance, involvement in learning including time on task and asking questions, and wider participation in extracurricular activities. Briefly, behavioural engagement can thus be described as the time and effort students devote to academic work. Cognitive engagement goes deeper than behavioural engagement and can be defined by "the student's psychological investment in and effort directed toward learning, understanding, or mastering the knowledge, skills, or crafts that academic work is intended to promote" (Newmann, Wehlage, & Lamborn, 1992, p. 12). Cognitive engagement thus refers to internal behaviours, such as the quality of processing learning content. Comparing behavioural and cognitive engagement, the former is focused on 'basic' behavioural effort, whereas the latter focuses on mental effort. Examples of variables that are often seen as aspects of cognitive engagement are self-regulation and the use of learning strategies (Fredricks et al., 2004). Affective engagement is constructed from perceived relationships with teachers, perceived support from peers, and perceived support from family. Many researchers describe this component as sense of belonging (Landis & Reschly, 2013). Although not part of the three original aspects of engagement, another engagement dimension that can be thought of as relevant for students in the highest levels of education

is intellectual engagement. Ackerman, Kanfer, and Goff (1995), p. 276) defined intellectual engagement as "a personality construct that represents an individual's aversion or attraction to tasks that are intellectually taxing and is thus related to acculturative and purposeful development and expression of certain intellectual abilities". Broadly speaking, intellectual engagement thus refers to individual differences in the tendency to engage in intellectual activities. In this study we will focus on behavioural, cognitive, and intellectual engagement.

Previous research consistently showed positive relationships between engagement factors and learning outcomes (Klem & Connell, 2004). Especially in the last decades many studies on student engagement have been performed. Some notable outcomes include that engagement deteriorates over the years (Schlechty, 2002) and that girls are more highly engaged than boys (Goodenow, 1992; Yazzie-Mintz, 2007). Yazzie-Mintz's (2007) large-scale study of data on more than 80.000 high school students in the United States found that 72% of students indicated that they were engaged in school, leaving many students disengaged. To conclude, Willms (2003) made a crucial note by stating that engagement does not predict academic success for each and every student, since OECD research showed that many disengaged students still perform well academically. However, also disengaged but well performing students are at risk to experience a difficult transition to higher education: Whereas their intelligence may have made it possible for them to obtain sufficient grades during high school, this may not be the case anymore in higher education, where the demands are higher.

A typology of secondary school students, based on dimensions of engagement, might provide a rough view of which groups of students seem more or less prepared for university. Methods such as cluster analysis, or the increasingly popular latent class analysis (for categorical data) or latent profile analysis (for continuous data), provide the tools to make such a typology. These methods are person-centered approaches, and differ from variable-centered approaches, such as correlational analysis. The benefit of a person-centered approach is that it is able to shed more light on combinations of characteristics within the individual (a 'profile') by examining which different profiles can be found based on a number of indicator variables. Consequently, analyses can be performed to investigate how these different profiles are related to other variables. What we were interested in here is to investigate which different engagement profiles could be distinguished in high school students and how these profiles were related to the same students' success later on when they were studying at university. Therefore, we sought to

relate the engagement profiles as formed in the last grade of secondary education to academic adjustment and achievement in university.

5.2 Profile indicators in secondary education: three dimensions of student engagement

What causes students to do well in education? Von Stumm, Hell, and Chamorro-Premuzic (2011) identified three pillars of academic performance: intelligence, effort, and intellectual curiosity. Thus, there is a difference between a student's maximum and typical performance, such that the former is indicated by the student's ability, but the latter reflects non-cognitive factors, such as curiosity and effort. If we restrict the range of intelligence, effort and curiosity become more important for explaining academic performance (Chamorro-Premuzic & Furnham, 2003). Students in a differentiated school system – such as pre-university students in Dutch secondary education, to which students are admitted on the basis of their abilities – likely do not differ much in maximum performance, but their typical performance varies greatly, which can be explained by differences in their effort and curiosity. In this study, we used engagement as an overarching concept that encompasses both effort and curiosity aspects. Following the dimensions of engagement as discussed above, effort can be categorised as behavioural engagement when it is conceptualised as 'simple' behavioural effort, such as attending class and completing assignments. Effort in the sense of mental effort, like the use of learning strategies, can be considered cognitive engagement. Last, curiosity can be viewed a form of intellectual engagement. Below we will discuss these three dimensions in more detail and elaborate on the constructs that were used in this study.

5.2.1 Behavioural engagement

Behavioural engagement consists of several indicators, including effort, attendance, time on task, and persistence (Fredricks et al., 2004). Research confirmed that this type of engagement predicts academic achievement (Chase, Hilliard, Geldhof, Warren, & Lerner, 2014; Dotterer & Lowe, 2011).

5.2.2 Cognitive engagement

Whereas behavioural engagement refers more or less to the quantity of students' engagement in school work, cognitive engagement focuses on the quality (Davis,

Summers, & Miller, 2012). Learning strategies or approaches describe how students learn; they also provide good indicators of the quality of students' engagement while learning, i.e., how much mental effort a student devotes to learning activities. Greene and Miller (1996) distinguished shallow cognitive engagement, such as surface learning, and meaningful cognitive engagement, such as a deep learning approach and self-regulated learning. Research specifically highlights the importance of meaningful cognitive engagement explaining achievement, specifically in the form of self-regulated strategies and a deep learning approach (Richardson, Abraham, & Bond, 2012). The use of metacognitive and self-regulated learning approaches is important in university education, where less external regulation exists. Metacognition makes a unique contribution to explaining academic achievement (e.g., Veenman, Kok, & Blöte, 2005), and research on time management – an important element of self-regulated learning – revealed its consistent relationship with academic achievement (Britton & Tesser, 1991; Macan, Shahani, Dipboye, & Phillips, 1990). In contrast with studies of these self-regulated learning strategies, research into the relationship of surface (e.g., rehearsal, memorisation) and deep (e.g., elaboration, critical thinking, integrating) learning approaches with achievement is somewhat equivocal. The use of deep learning approaches contributes to better achievement (Furnham, Monsen, & Ahmetoglu, 2009; Lau, Liem, & Nie, 2008), though some studies (Busato, Prins, Elshout, & Hamaker, 1998; Cassidy & Eachus, 2000) indicated that deep learning does not influence academic achievement, because working hard and conscientiously is sufficient, regardless of the type of learning strategy applied. This ambiguity might arise from differences in learning environments and their demands (e.g., examination requirements), which determine whether a specific learning strategy is effective. Regardless of environmental circumstances, however, substantial research relates the likelihood that people use certain learning strategies to durable personality differences.

5.2.3 Intellectual engagement

Intellectual engagement is the third engagement dimension we focused upon in this study. It refers to the extent to which a person engages in intellectual activities (Woo, Harms, & Kuncel, 2007). A construct capable of measuring intellectual engagement is need for cognition, which Cacioppo, Petty, and Kao (1984), p. 306) defined as "an individual's tendency to engage in and enjoy effortful cognitive endeavours". In an overview of need for cognition research, Cacioppo,

Petty, Feinstein, and Jarvis (1996) showed that this need is modestly correlated with grade point average in high school. Intellectual engagement does not only emphasise engagement, but also interest and values (Woo et al., 2007). Therefore, another useful concept to map intellectual engagement is academic interest. By academic interest, we meant a desire to gain academic knowledge in general, regardless of the field, and to conduct research. To pursue university education, in which students are exposed to academic knowledge, students should be interested in obtaining academic knowledge in their focal field, because interest is a powerful predictor of learning outcomes (Ainley, Hidi, & Berndorff, 2002). Feist (2012) showed that a students' level of academic interest is influenced by need for cognition, such that students with high levels of need for cognition likely were more interested in gaining academic knowledge than were low need for cognition students.

5.2.4 Self-efficacy

Self-efficacy is a strong predictor of study success in higher education and consistently was a main predictor in meta-analyses of student success (Richardson et al., 2012; Robbins et al., 2004). Academic self-efficacy is the confidence a student has that he or she will be able to attain specific academic goals or successfully perform certain academic behaviours. Due to its proven connection to student success in higher education, and since our study focuses on the transition to higher education, we included two measures of self-efficacy in our analyses. One of these was self-efficacy in exerting the necessary effort that is needed to succeed in university-level studies, e.g., being confident that one can manage to study at a regular basis and attend class even when the class is perceived as boring. This type of self-efficacy could be categorised within behavioural engagement. The second one, related to intellectual engagement, was self-efficacy in understanding difficult content, e.g., being confident that one can follow a lecture on a difficult concept and understand difficult passages in a study book.

5.3 Outcomes in university: achievement and academic adjustment

5.3.1 Achievement

In this study we looked at students' grade point average (GPA) and the number of credits they had attained (EC) in the first semester of the first year of their university studies. Previous research showed that first-year results are valid predictors of student success throughout higher education. For example, Kahn and Nauta (2001) found that first-semester GPA was the primary predictor of persistence to the sophomore year, Allen and Robbins (2007) found that first-year GPA was a strong predictor of major persistence, and Pascarella and Terenzini's (2005) review emphasised the crucial role of first-year college GPA in predicting educational attainment and persistence.

5.3.2 Academic adjustment

Next to achievement in university, we also investigated how the profiles differed regarding academic adjustment. A student's level of adjustment to the new environment is an effective measure of how well a student has made the transition to university, since adjustment refers to how well a person can cope with the demands of a new situation. Academic adjustment then refers to the ability to cope with the academic demands of the university environment (Baker & Siryk, 1989), which depends on four separate aspects: motivation to learn and having clear academic goals; applying oneself to academic work; exerting effort to meet academic demands; and being satisfied with the academic environment (Baker & Siryk, 1984). Prior literature consistently showed the importance of academic adjustment in predicting performance (Kamphorst, Hofman, Jansen, & Terlouw, 2012; McKenzie & Schweitzer, 2001; Prins, 1997; Rienties, Beausaert, Grohnert, Niemantsverdriet, & Kommers, 2012) and persistence (Kennedy, Sheckley, & Kehrhahn, 2000) in higher education. In this study, we focused only on academic adjustment and not on social or personal-emotional adjustment, because previous research consistently showed that academic adjustment has the most influence on academic achievement (Bailey & Phillips, 2016; Rienties et al., 2012). Moreover, academic adjustment explained variance in achievement beyond high school GPA, traditionally the most important predictor of university achievement (McKenzie & Schweitzer, 2001). This makes academic adjustment an important concept to emphasise when investigating study success, and specifically the transition from secondary to university education.

5.4 Research questions

This study sought to identify meaningful groups of secondary school students who shared the same characteristics on the dimensions of engagement – behavioural, cognitive, and intellectual – and to determine how these groups differed in academic adjustment and achievement in university. Through this profiling, insight is gained into individual differences in engagement and into how the different combinations of the three dimensions of engagement in high school would predict success in university. Our research thus was guided by two main questions:

1. Which student profiles emerge in the last grade of secondary school from the indicators of behavioural, cognitive, and intellectual engagement?
2. How do these groups differ one year later in their academic adjustment and achievement in university?

Figure 5.1 provides an overview of the design of the study.

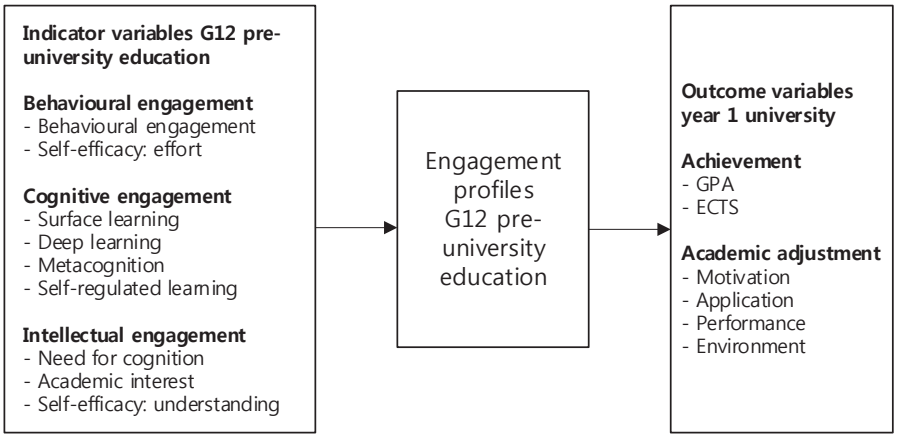

Figure 5.1 Design of the study

5.5 Method

5.5.1 Sample

The sample that was used to answer the first research question consisted of 669 grade 12 pre-university students from 11 schools in the Netherlands. They filled out

the questionnaires in 2014. Girls were overrepresented (56%), reflecting the trend by which more girls than boys attend the highest levels of secondary education (Coenen, Meng, & Van der Velden, 2011). In the Netherlands, students choose in grade 10 whether they wish to take courses in science or humanities and social sciences, in addition to obligatory subjects such as Dutch and English. The science track was pursued by 57% of the students in our sample, whereas 43% planned to graduate from high school in humanities and social sciences. At the end of the questionnaires students were asked if they were willing to provide their e-mail address, so that they could be contacted one year later for follow-up research. 263 students wrote down their e-mail address and received an e-mail in 2015 that asked them to fill out an online questionnaire on their current activities and, if they indicated they were attending university, on their achievement and academic adjustment. 127 students (48%) completed this questionnaire and 90 (71%) of those 127 were studying at a university. The responses of these 90 students were used for the analysis of the second research question, the relationship between the engagement profiles and achievement and adjustment in university. In this second sample, females were overrepresented (69%), as were students who had pursued the science track in high school (67%).

5.5.2 Measures

Indicator variables

The indicator variables we used to classify the students were factors belonging to the three dimensions of engagement: two behavioural engagement measures (behavioural engagement and self-efficacy in effort), four cognitive engagement measures (surface learning, deep learning, metacognition, and self-regulated learning), and three intellectual engagement measures (need for cognition, academic interest, and self-efficacy in understanding). Table 5.1 provides an overview of the variables, including their measurement information and sample items.

Table 5.1 Factors for the indicator variables

Factor	Sample item	Number of items	Scale range	Cronbach's alpha
Behavioural engagement				
Behavioural engagement	I actively participate in class.	8	1-5	.86
Self-efficacy: effort	Always attending lectures, even if you think they are boring.	4	1-5	.73
Cognitive engagement				
Surface learning strategy	I make lists of important items and memorise the lists.	4	1-7	.60
Deep learning strategy	Whenever I read or hear an assertion in class, I think about possible alternatives.	15	1-7	.80
Metacognitive learning strategy	If I get confused taking notes in class, I make sure I sort it out afterwards.	12	1-7	.71
Self-regulated learning	I usually study in a place where I can concentrate on my course work.	12	1-7	.76
Intellectual engagement				
Need for cognition	I would prefer simple to complex problems. (reverse coded)	18	1-5	.86
Academic interest	I like the idea of gaining academic knowledge in the field of my interest.	17	1-5	.92
Self-efficacy: understanding	Understanding a lecture on a difficult topic.	8	1-5	.85

Behavioural engagement. The items that were used to measure behavioural engagement were based on existing instruments that measured engagement, such as the Student Engagement Instrument (Appleton, Christenson, Kim, & Reschly, 2006) and the Student Engagement in Schools Questionnaire (Hart, Stewart, & Jimerson, 2011). To develop a reliable measure, we proceeded through three steps. First, we chose useful items referring to attendance (e.g., "I skip classes" (reverse-coded)) and 'basic' effort (e.g., "I pay attention in class") and translated them into Dutch with a back-translation procedure, resulting in an initial version of the scale. Second, we tested this initial version with a small number of students in upper-grade pre-university classes. Third, we conducted analyses to eliminate any redundant items and establish the psychometric qualities of the instrument. Students responded on a five-point Likert-scale (1 = 'does not describe me at all'; 5 = 'describes me very well'). The final version of the scale consisted of eight items and had a reliability of α =0.86.

Cognitive engagement. The four learning strategies were measured with Part B of the Motivated Strategies for Learning Questionnaire (MSLQ) (Pintrich, Smith,

Garcia, & McKeachie, 1991). We made some slight adaptations to the MSLQ: Instead of referring to a specific subject, we rephrased the statements to refer to students' general habits of studying, regardless of the subject. The reasoning behind this was that we were interested in students' general strategy use, regardless of how interested they were in a subject, as in university studies they would also encounter classes that may and may not interest them. Following Vrugt and Oort (2008), we used the MSLQ rehearsal subscale to form the surface learning strategy and the elaboration, organization, and critical thinking subscales to form the deep learning strategy. The metacognitive learning strategy consisted of the metacognitive self-regulation subscale from the MSLQ. Self-regulated learning consisted of the time/study environmental management and effort regulation subscales. The internal consistency scores ranged from 0.60 to 0.80.

Intellectual engagement. Need for cognition was measured with 18 items from the efficient version of the Need for Cognition scale by Cacioppo et al. (1984). It consists of one factor and has good internal consistency (Sadowski, 1993); we found $\alpha = 0.86$. The extent to which a student has academic interest (regardless of the domain, so not only natural sciences but also humanities and social sciences) was measured by 17 items, based on the Scientific Attitude Inventory II (SAI II; Moore & Foy, 1997). The same three development stages were followed as for the behavioural engagement measure. Students responded on a five-point Likert-scale (1 = 'completely disagree'; 5 = 'completely agree'). Academic interest was internally consistent ($\alpha = 0.92$).

Self-efficacy. To measure self-efficacy, we used items from the College Academic Self-Efficacy Scale (CASES; Owen & Froman, 1988). This questionnaire contains typical behaviours that students need to demonstrate at university. The respondents rated, on a five-point Likert scale, how confident they were that they could perform these behaviours. Three items from the original questionnaire were dropped because they were not appropriate for the current situation at Dutch universities. Previous research has reported good internal consistency (Olani, 2009; Owen & Froman, 1988), and we found $\alpha = 0.88$. In addition to the overall factor, the factor analysis in SPSS distinguished three separate factors of college self-efficacy: confidence in putting in the necessary effort (e.g., attending class even when you find the topic boring, $\alpha = 0.73$), confidence in behaviours associated with understanding difficult content ($\alpha = 0.85$), and confidence in social skills typical of university life (e.g., making new friends, attending social activities, $\alpha = 0.66$). We used the first measure, self-efficacy in effort, as an addition to the behavioural

engagement measure, and the second one, self-efficacy in understanding, as an addition to intellectual engagement. We did not use social self-efficacy, because that was outside the scope of this study.

Background variables

We investigated how the profiles related to gender, choosing a science or humanities/social sciences track, high school GPA and whether students planned to attend university after graduation from high school. High school GPA at the moment of research participation was provided by the administrative boards of nine of the 11 participating schools, such that we had 546 students' GPAs. The Dutch grade point system ranges from 1 to 10, where grades above 5.5 are satisfactory and grades above 8 are good.

Academic adjustment and achievement in university

To answer our second research question about how the latent profiles related to measures of university success, we investigated how latent class membership linked to academic adjustment and achievement of the same students one year later. An overview of these outcomes is available in Table 5.2. We measured students' academic adjustment with the academic adjustment subscale of the Student Adaptation to College Questionnaire (SACQ) by Baker and Siryk (1984). This scale consists of 24 questions that involve coping with the academic demands of the university experience. Baker and Siryk (1984) distinguished between four facets of academic adjustment: motivation, which refers to students' attitudes toward academic goals and the academic work they have to do; application, which refers to how well students apply themselves to their academic work; performance, which concerns the effectiveness or sufficiency of students' academic efforts; and environment, which is about how satisfied students are with the academic environment. In line with Baker and Siryk's internal consistency measures for the scale, which ranged from $\alpha = 0.82$ to 0.87, the alpha of our scale was 0.86. Reliability of the four subscales ranged from 0.70 to 0.81.

Table 5.2 Outcome measures

Factor	Measurement information or sample item	Number of items	Scale range	Cronbach's alpha
Achievement				
GPA	Average self-reported grade attained at courses in the first semester of university.	NA	1-10	NA
EC	Self-reported number of credits attained in the first semester of university. Since not all degrees had the same number of credits that could be earned, this measure had a scale from 1 (none of the credits that could be attained) to 5 (all of the credits that could be attained so far).	NA	1-5	NA
Academic adjustment				
Overall academic adjustment		24	1-5	.86
Motivation	I enjoy academic work.	6	1-5	.71
Application	I keep up-to-date with academic work.	4	1-5	.70
Performance	I find academic work difficult. (reverse coded)	9	1-5	.73
Environment	I am satisfied with the programme of courses.	5	1-5	.81

5.5.3 Procedure

Secondary school data was gathered in 2014. After obtaining informed consent from the students' parents, the participating students were asked by the researcher or a teacher instructed by the researcher to fill out three questionnaires (need for cognition, engagement, and learning strategies; college self-efficacy and academic interest; and study choice process (not used in this study)). The questionnaires were all paper-and-pencil tests, and students completed them at the beginning of two separate classes, in order to prevent fatigue. Overall, it took the students about an hour to complete all questionnaires. University data was gathered in 2015 through an online questionnaire. Participants gave consent to use their data and to merge their results with the data gathered in high school one year earlier.

5.5.4 Statistical analyses

To identify the optimal number of latent groups that could be identified in the data from the continuous indicator variables, we conducted a latent profile analysis (LPA) using Mplus 7. Because the scales of the indicator variables had different ranges, we standardised the scores. We fitted models varying from a two- to six-class solution. We used several fit statistics to determine which model fit the data best: Akaike's information criterion (AIC; Akaike, 1987), Bayesian information criterion (BIC; Schwartz, 1978), adjusted BIC (ABIC), Vuong-Lo-Mendell-Rubin likelihood ratio test (VLMRT; Vuong, 1989), and the entropy statistic. For the

AIC, BIC, and ABIC, lower values are proof of a better fitting model (Flaherty & Kiff, 2012). The VLMRT compares models for k and $k - 1$ classes. If the ratio test results in a significant p-value, the k class model is a better fit than the $k - 1$ class model (Tofighi & Enders, 2008). Higher entropy indicates less classification error (Collins & Lanza, 2010). As has been discussed widely though (e.g., Marsh, Lüdtke, Trautwein, & Morin, 2009; Pastor, Barron, Miller, & Davis, 2007), fit statistics do not tell the whole story and should not be followed blindly. Therefore, we also determined whether the classes in a k class solution were interpretable and meaningful, by checking their face validity and determining the percentage of students in the smallest class. We thus could confirm that the classes were large enough to be meaningful and of practical value.

After determining which number of classes fit the data best, we assigned students to the class for which their probability of membership was highest. With analyses of variance (ANOVAs) and post hoc comparisons (Bonferroni), we investigated differences between the latent classes on the indicator variables. To investigate whether the latent classes differed regarding achievement and adjustment in university we performed ANCOVAs, so that we could control for differences due to age, gender, and coursework in secondary school (science vs. humanities/social sciences).

5.6 Results

5.6.1 Fit statistics

Table 5.3 shows the goodness-of-fit measures that we used to determine the number of classes that provided the best fit for our data. Considering the significant p-value of the VLMRT, the entropy value, and the substantial drop in the ABIC from the four- to the five-class solution, we determined that the five-class solution offered the best fit. Across the five groups identified by the LPA, we found that they differed in meaningful ways and were sufficiently large to have practical value (>5%). On the basis of both the interpretability of the classes and the model fit indices, we thus chose a five-class solution.

Table 5.3 Fit results of the 2- to 6-class solutions

Model	Number of free parameters	AIC	BIC	Adjusted BIC	VLMRT *p*-value	Entropy	Percentage of students in smallest class
2-class	28	13647.87	13773.65	13684.75	<.01	.77	40
3-class	38	13294.68	13465.39	13344.73	<.01	.79	23
4-class	48	13056.31	13271.93	13119.53	.08	.78	9
5-class	**58**	**12850.85**	**13111.40**	**12927.25**	**.02**	**.78**	**7**
6-class	68	12726.07	13031.55	12815.64	.76	.79	6

5.6.2 Descriptions of the five profiles, based on the engagement dimensions

The names of the profiles reflected their most striking characteristics, e.g., the class with very low intellectual engagement scores was named 'intellectually highly disengaged'. Figure 5.2 shows the standardised scores on the indicator variables for each profile. Table 5.4 offers an overview of some background characteristics of these latent profiles.

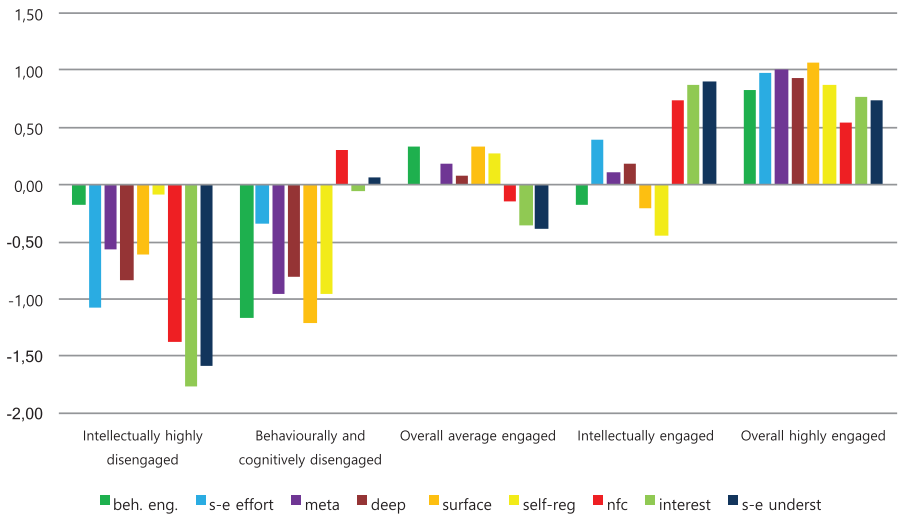

Figure 5.2 Students' standardised scores on the indicator variables per latent profile

Notes: beh eng = behavioural engagement; s-e effort = self-efficacy in effort; meta = metacognition; deep = deep learning; surface = surface learning; self-reg = self-regulated learning; nfc = need for cognition; interest = academic interest; s-e underst = self-efficacy in understanding.

Table 5.4 Background characteristics of the latent profiles

Characteristic	Total sample	Intellectually highly disengaged	Behaviourally and cognitively disengaged	Overall average engaged	Intellectually engaged	Overall highly engaged
% of students (number)	100 (656)	7.3 (48)	14.2 (93)	36.1 (237)	21.5 (141)	20.9 (137)
% male (vs. female)	43.9	31.3	68.8	37.1	54.6	32.1
% science (vs. humanities & social sciences)	57.4	40.0	57.4	53.8	67.3	58.3
Average GPA	6.68	6.55	6.53	6.70	6.60	6.89
% of students planning to attend university	68.6	34.2	67.5	60.7	81.9	80.3

The smallest latent profile (n = 48; 7.3%), scored relatively very low on all intellectual engagement indicators, even approaching the −2 SD point, which is why we referred to this group as intellectually highly disengaged. Their behavioural and cognitive engagement was well below average. In terms of their background characteristics, the intellectually disengaged learners had a relatively low high school GPA, and female and humanities and social sciences students were overrepresented. The second smallest class (n = 93; 14.2%) consisted of students who scored about 1 SD below average on most behavioural and cognitive engagement factors. In contrast to the first group, however, these students had average intellectual engagement, which is why we called this group behaviourally and cognitively disengaged. This group had a relatively low high school GPA and had the highest percentage of male students (68.8%, while the percentage of male students in the total sample was 43.9). The percentage of science students did not differ from the percentage in the total sample. The largest latent class (n = 237; 36.1%) scored around the average on most factors, hence we referred to them as overall average engaged. Their behavioural and cognitive engagement was higher than their intellectual engagement. Female and humanities and social sciences students were somewhat overrepresented. The average engaged learners had an average high school GPA. The fourth class (n = 141; 21.5%) scored average on most behavioural and cognitive engagement factors and the highest of all groups on intellectual engagement: Thus, we referred to this group as intellectually engaged. Their scores for behavioural engagement, surface learning and self-regulated learning were a bit below average. Male students and students pursuing the science track were overrepresented in this group. Their high school GPA did

not differ much from the overall average GPA. The last group consisted of one fifth of all grade 12 students (n = 137; 20.9%). These students had the highest scores on behavioural and cognitive engagement, and the second highest on intellectual engagement, which is why we called this group overall highly engaged. Female students were overrepresented in this class, but there was no notable difference from the total sample regarding coursework. The highly engaged learners had the highest high school GPA of all groups. Whereas 68.6% of the students in the total sample indicated they were planning to attend university after graduating from pre-university, notably less intellectually highly disengaged learners did so (34.2%) and more intellectually engaged, and overall highly engaged learners did so (81.9 and 80.3%).

Bonferroni post hoc comparisons showed that all classes differed significantly ($p < 0.01$) from one another in their surface learning and self-regulated learning (Table 5.5). On the other variables, varying pairs of classes had comparable scores. As can be derived from the R-square values in the last column of Table 5.5, substantial variance in the indicator variables could be explained by class membership. The largest effects of class membership appeared in the academic interest ($R^2 = 0.60$), surface learning ($R^2 = 0.45$), and metacognition ($R^2 = 0.44$) measures.

5.6.3 Relationships between latent profiles and university success

To determine whether and how the profiles related to university success, we compared them on grade point average (GPA) and number of attained credits (EC) in the first semester of the first year of university and on four measures of academic adjustment (see Figure 5.3 and Table 5.6).

Table 5.5 Mean scores on indicator variables per latent profile and post hoc comparisons

Indicator variable	Total sample mean (*SD*)	Intellectually highly disengaged	Behaviourally and cognitively disengaged	Overall average engaged	Intellectually engaged	Overall highly engaged	*p*	*F*	R^2
Behavioural engagement									
Behavioural engagement	3.66 (.73)	3.50a	2.73b	3.85c	3.50a	4.23d	< .01	101.53	.41
Self-efficacy: effort	3.73 (.70)	3.27a	3.29a	3.68b	3.75b	4.24c	< .01	35.28	.19
Cognitive engagement									
Surface learning strategy	4.60 (.97)	4.48a	3.56b	4.85c	4.08d	5.50e	< .01	117.22	.45
Deep learning strategy	4.48 (.72)	3.76a	3.76a	4.48b	4.55b	5.17c	< .01	104.37	.42
Metacognitive learning strategy	4.82 (.68)	4.32a	4.04b	4.87c	4.80c	5.48d	< .01	114.58	.44
Self-regulated learning	4.57 (.76)	4.03a	3.57b	4.80c	4.38d	5.31e	< .01	171.92	.40
Intellectual engagement									
Need for cognition	3.55 (.48)	2.76a	3.33b	3.42b	3.90c	3.80c	< .01	107.45	.42
Academic interest	3.56 (.70)	2.21a	3.46b	3.23c	4.14d	4.03d	< .01	223.06	.60
Self-efficacy: understanding	3.82 (.49)	3.21a	3.69b	3.72b	3.94c	4.15d	< .01	43.32	.23

Note: Within-row means with the same letters did not differ significantly from each other ($p < 0.05$).

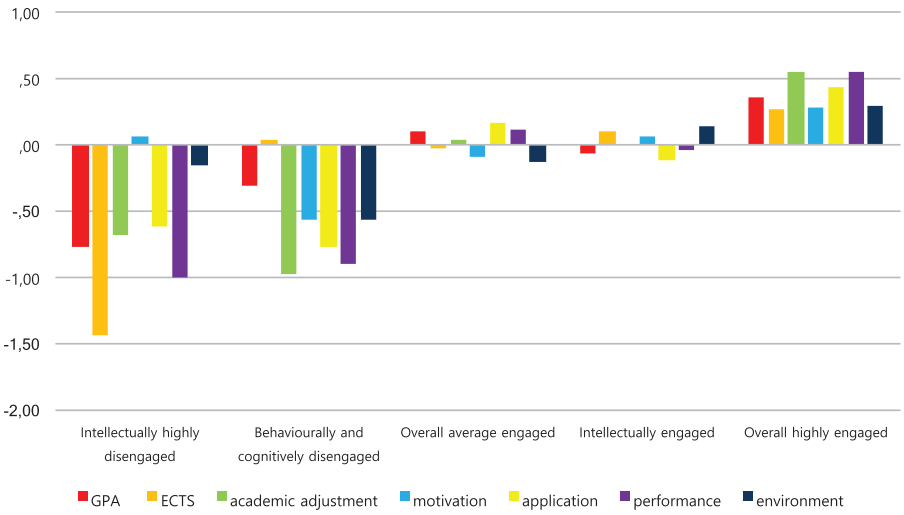

Figure 5.3 Students' standardised scores on achievement and academic adjustment in university, per latent profile

The results of the ANCOVA – we accounted for the effects of age, gender, and coursework in secondary school (science vs. humanities/social sciences) – showed that the profiles differed significantly in the number of attained credits, $F(4, 67) = 2.83$, $p = 0.03$: Intellectually highly disengaged students had earned significantly less credits than intellectually engaged and overall highly engaged students. The profiles also differed in overall academic adjustment, $F(4, 73) = 3.35$, $p = 0.01$: behaviourally and cognitively disengaged learners were significantly less academically adjusted than overall highly engaged learners. Looking into the specific dimensions of academic adjustment, we saw significant differences between the profiles on performance, $F(4, 73) = 5.14$, $p < 0.01$: Intellectually highly disengaged learners and behaviourally and cognitively disengaged learners scored significantly lower than overall highly engaged learners, which means that the latter had less problems in exerting academic efforts that were sufficient and efficient than the former two groups. Although the groups' average GPAs varied from 6.40 for the intellectually highly disengaged and 7.53 for the overall highly engaged, this difference was not significant. The adjustment dimensions motivation (i.e., motivation to do academic work), application (i.e., applying yourself to academic work in university), and environment (i.e., satisfaction with the academic environment at university) also did not show significant differences between the profiles. The amount of variance in achievement and academic adjustment explained by profile membership was quite small. The adjustment dimension performance was affected most by class membership ($\eta^2 = 0.22$).

Table 5.6 Achievement and adjustment in university, per latent profile

University outcomes	Total sample mean (*SD*)	Intellectually highly disengaged (5.6%)	Behaviourally and cognitively disengaged (7.8%)	Overall average engaged (33.3%)	Intellectually engaged (35.6%)	Overall highly engaged (17.8%)	*p*	*F*	η^2
Achievement									
GPA	7.17 (1.00)	6.40	6.86	7.27	7.10	7.53	.21	1.51	.08
EC	4.63 (.79)	3.50	4.67	4.61	4.71	4.85	.03	2.83	.14
Academic adjustment									
Overall academic adjustment	3.69 (.43)	3.40	3.27	3.71	3.69	3.92	.01	3.35	.14
Motivation	4.07 (.51)	4.10	3.79	4.02	4.10	4.21	.28	1.29	.07
Application	3.52 (.85)	3.00	2.86	3.66	3.41	3.90	.14	1.81	.09
Performance	3.34 (.54)	2.80	2.86	3.41	3.32	3.64	<.01	5.14	.22
Environment	3.96 (.54)	3.88	3.66	3.89	4.03	4.11	.34	1.14	.06

Notes: In the analyses is corrected for the effects of the covariates age, gender, and coursework in secondary school (science vs. social sciences/humanities). Significant differences between latent profiles: EC: intellectually highly disengaged < intellectually engaged, overall highly engaged; overall academic adjustment: behaviourally and cognitively disengaged < overall highly engaged; performance: intellectually highly disengaged, behaviourally and cognitively disengaged < overall highly engaged ($p < 0.05$).

5.7 Discussion

5.7.1 Discussion of the main findings

For this study, we were interested in knowing whether students' characteristics in secondary school would affect their success in university. We used LPA to identify five groups of grade 12 pre-university students who shared the same characteristics on three dimensions of engagement: behavioural, cognitive, and intellectual engagement. One year later, we investigated how group membership related to academic adjustment and achievement in the first semester of university. One group, the overall highly engaged learners (21%), scored high on all measures of engagement in secondary school and had the highest achievement and academic adjustment in university. Being engaged behaviourally, cognitively, and intellectually during high school thus in general seemed to lead to a successful transition to university education. The largest group, the overall average engaged students (36%), scored average on behavioural and cognitive engagement, but below average on intellectual engagement. In other words, although these students worked hard (behavioural engagement) and were able to use learning strategies (cognitive engagement), their attractiveness to intellectual activities was somewhat low (intellectual engagement). These students' achievement and academic adjustment in university was average. The intellectually highly disengaged students (7%) were the second group that showed lower intellectual engagement than behavioural and cognitive engagement. Their behavioural and cognitive engagement was below average and their intellectual engagement was very much below average. These students had the lowest GPA and EC in university. Their adjustment, most notably regarding application (i.e., applying themselves to their academic work) and performance (i.e., exerting academic efforts that are sufficient and efficient), was below average. Interestingly, this group had the highest percentage of secondary school students who indicated in grade 12 that they did not intend to go to university, so maybe they had a good level of self-knowledge that made them realise university would be an environment that required a certain level of intellectual engagement as well as behavioural and cognitive commitment which did not match their characteristics.

The behaviourally and cognitively disengaged students (14%) and the intellectually engaged students (22%) were perhaps the most interesting. These students earned average respectively high scores on need for cognition and academic interest but this did not translate into a same level of behavioural and

mental effort. Likewise, their confidence in being able to put in the necessary amount of effort to succeed at university was substantially lower than their confidence that they could understand university-level content – as opposed to the other three groups who had more faith in their effort than in their intellectual capability. Interestingly, even their scores on deep learning and self-regulated learning fell behind their intellectual engagement scores, while Evans, Kirby, and Fabrigar (2003) showed that these two learning strategies are associated with intellectual engagement, and Von Stumm and Furnham (2012) found a positive relationship between measures of curiosity and deep learning, and a negative one with surface learning. This finding that the association between meaningful learning strategies and intellectual engagement was not strong for every profile also showed the added value of the person-centered research approach. Nonetheless, the fact that these two groups, as opposed to the other three groups, had higher scores on deep learning than on surface learning was in line with this previously established association in variable-centered research. The question is how this difference between the level of intellectual engagement on the one hand and behavioural and cognitive engagement on the other hand can be explained. One explanation may be that the intellectual engagement indicators can be seen as motivational constructs, whereas the behavioural and cognitive engagement indicators such as effort and actively applying learning strategies emphasise actual behaviour. Being motivated and being behaviourally engaged are not the same. Appleton et al. (2006) also referred to this distinction by emphasizing that motivation (or in this case need for cognition, academic interest, and being confident in your ability to understand difficult learning content) is a necessary, but not sufficient condition for engagement: "One can be motivated, but not actively engage in a task" (p. 428). Following this line of thought, one cannot assume that students high in intellectual engagement automatically are behaviourally engaged students, even though at first sight they may seem excellent students because they may talk about academic topics that interest them or show that they enjoy cognitive endeavours such as solving difficult problems. Another explanation for the contrast between behavioural and cognitive engagement and intellectual engagement could be that these students are, although motivated for intellectual work, not motivated in schoolwork and hence do not transfer their curiosity and interest to the school context. When looking at the intellectually engaged students, who even outperform the overall highly engaged students on the indicators of intellectual engagement, these may be students who are not being sufficiently

challenged in school and consequently have become bored and disengaged in class. An important task for secondary school teachers is to try to ignite these students' curiosity, interest, and self-estimated capability of understanding difficult subject matter in such a way that their actual effort in school work will rise. This is important, because these students may be at risk of underachieving and this study showed that these students may experience a difficult transition to university: The academic adjustment scores of the behaviourally and cognitively disengaged students were lowest of all groups on almost all indicators – even lower than the scores of the intellectually highly disengaged students (the students who were disengaged overall and showed very low intellectual engagement).

When looking at the background characteristics, one interesting finding was that the two groups discussed above consisted of significantly more male students. Having relatively high intellectual engagement but lower behavioural and cognitive engagement thus seemed to be a typical male engagement pattern. This is consistent with research that shows that boys put less effort into schoolwork (Fischer, Schult, & Hell, 2013). Boys' poor effort is a problem that continues to contribute to the growing gender gap in education. To prepare boys better for university and lower their risk of dropping out, strategies that increase their effort to learn should be a central focus. Another interesting background finding was that students pursuing a science track in high school could be found more often in the group of intellectually engaged students, whereas humanities/social sciences students were overrepresented in the intellectually highly disengaged group. As Figure 2 showed, these two groups were at the opposite ends of the spectrum of intellectual engagement indicators, so science students seemed to have a higher need for cognition, more academic interest, and more confidence in their capability to understand difficult content than humanities/social sciences students. First of all, this could be self-selection. In grade 10, students chose their track. Those students who were not particularly intrinsically intellectually engaged may have opted for humanities/social sciences coursework because according to a widespread stereotype in the Netherlands this high school track would be less challenging (Groot, 2016). However, it could also be the case that students' intellectual engagement was being aroused more in science subjects than in humanities/social sciences subjects, for example because in the former subjects, teachers more often apply enquiry-based learning (Anderson, 2002).

To conclude, among groups of students, it is reasonable to distinguish between intellectual engagement on the one hand and school-related behavioural

and cognitive engagement on the other hand. That is, our person-centered analysis clearly showed that the students with high need for cognition and academic interest were not necessarily the same students who also put in the necessary effort in their school work and adopted useful learning strategies, even though variable-centered approaches implied that curiosity related positively to effort (Chamorro-Premuzic, Furnham, & Ackerman, 2006; Goff & Ackerman, 1992). Identifying this distinction clearly is an important result, because research indicates that both being curious and putting in effort are important for academic performance (Von Stumm et al., 2011), a result that our research also showed, since the overall average engaged and overall highly engaged students had the highest GPA in university and were most adjusted to their university studies.

5.7.2 Limitations

An important limitation of this study was that all the measures were self-reported. Self-reports can cause social desirability biases. Students also might not be able to rate their own behaviour and cognitions accurately, such as their use of learning strategies. Moreover, the amount of explained variance in the outcomes in university was rather low. Adding predictors in future research might increase this amount. It would, for example, be interesting to add personality traits, as the meta-analysis of adjustment research by Credé and Niehorster (2012) showed that these influence academic adjustment. Since these traits are relatively stable, they can already be measured in secondary education. Another limitation is that the number of students who filled out the follow-up questionnaire in university was relatively low and that female students were overrepresented in that sample. Moreover, regarding two of the five latent profiles there may have been some response bias in play: The percentage of university students belonging to the group of behaviourally and cognitively disengaged students was substantially smaller than the percentage of grade 12 students belonging to that group (7.8% in university and 14.2% in grade 12), whereas the percentage of university students in the profile of intellectually engaged students was higher than the percentage of grade 12 students belonging to this profile (35.6% in university and 21.5% in grade 12). Since we have no achievement data of students who did not respond to the questionnaire at university, we cannot test whether these students were performing worse than the students who completed the questionnaire. It seems plausible, however, that students who are more engaged in their education are more likely to respond to a questionnaire about how well they are doing in

university. As a consequence, it is probable that the achievement and adjustment differences between university students in different profiles would have been more pronounced if our university sample had been more representative. Future longitudinal research should therefore include a larger sample and a better balance of response across the five profiles. A last limitation is that this study took place in the Netherlands, where the secondary education system is highly differentiated and there is a specific secondary school track that aims to prepare students for university. Our findings can, nonetheless, also be relevant for countries with less differentiated systems, because regardless whether a student makes the transition to university from a comprehensive school or from a more selective type of secondary education (such as in the Netherlands), the issue of having to adjust academically to the new learning environment is present, as well as the fact that students likely differ in their levels of behavioural, cognitive, and intellectual engagement in secondary school. Moreover, a worldwide meta-analysis by Credé and Niehorster (2012) of studies that investigated academic adjustment showed that GPA in higher education was strongly related to academic adjustment. This emphasises the global importance of academic adjustment, and the need to further investigate this construct across countries and education systems. For example, it would be interesting to replicate the findings of our study in a country with a comprehensive secondary education system; to investigate whether the same engagement profiles would be found in secondary education and whether these profiles would also be related to the number of attained credits and academic adjustment in higher education.

5.7.3 Implications for secondary education

If teachers could get a rough view of students' engagement characteristics during secondary education, appropriate measures can be taken. With the goal of preparing students for a smooth transition to university, it is useful to pay attention specifically to behavioural and cognitive engagement, since the two groups with relatively lower scores on these factors had the lowest GPA and adjustment scores in university. Considering the profiles with relatively low cognitive engagement, these students clearly need to develop and use learning strategies more effectively to be sufficiently prepared for university. Unlike the relatively high level of external regulation in secondary education, university studies require students to be independent learners and regulate their own learning processes (Jansen & Suhre, 2010). This demand in turn requires metacognitive learning strategies and

self-regulated learning strategies, such as planning, monitoring, and regulating the learning process to regulate the use of time, study environment, and effort.

In the group of intellectually highly disengaged students, need for cognition and academic interest were lowest among all latent classes. Overall average engaged learners also scored below average on these intellectual engagement indicators. Teachers thus should pay particular attention to stimulating need for cognition and academic interest in students who do not seem to have this inside flame of curiosity burning. A useful starting activity might be to discuss with students what topics they find interesting; search for appealing, understandable academic knowledge related to these topics; then design an enjoyable, challenging assignment around this.

Looking at the university results of the students in the group of intellectually highly disengaged students, who had the lowest university GPA and almost 1.5 SD below the average number of attained credits, and the behaviourally and cognitively disengaged students, it also seems reasonable for teachers and guidance counsellors to discuss with students who seem to have low engagement whether university is the best future path. Our data showed that 34% respectively 67.5% of these students plan to enter university. For these students, career guidance and counselling talks might provide space to explain what factors matter for a successful start in university, e.g., the adjustment factors of application and performance, and that due to the students' current low engagement in secondary school the chances are high that he or she might end up struggling with those factors in university. Raising a student's self-awareness then might be a first step to remediation if the student is eager to attend university. After that, measures to help students develop the necessary skills and attitudes might be more effective.

The two profiles with high intellectual engagement scores but lower behavioural and cognitive engagement – the behaviourally and cognitively disengaged students and the intellectually engaged students – need their intellectual engagement to be leveraged to raise their effort and learning strategy use. These students like to be intellectually engaged, so in that sense they are very suitable for undertaking university education, but there may be a mismatch between their interests and the way topics are taught in school, which prevents them from transferring their intellectual engagement to the school setting. Even better than remediation that tries to re-engage these students would be prevention efforts. That is, students often enter secondary education enthusiastically, but their disengagement grows along the way (Kuh, 2007). The crucial question, central

to talent development and motivational research, with massive implications for the future of any society that strives to increase the number of well-prepared university students and highly educated employees, thus becomes: How can we prevent talented, curious students from becoming disengaged from high school?

5.7.4 Conclusion

In this study, we showed that there are five distinct engagement profiles of secondary school students. Once in university, students belonging to different profiles differ from each other regarding academic adjustment and the number of earned credits in the first semester. The characteristics of two of these groups, the intellectually highly disengaged students and the behaviourally and cognitively disengaged students, are such that these students might be at risk of problems in university: Their average university GPA was relatively low, as well as their scores on academic adjustment, especially regarding application and performance. Application, the extent to which students apply themselves to their academic work, and performance, the effectiveness or sufficiency of students' academic efforts, relate to behavioural and cognitive engagement aspects, so it may be useful if these students receive extra guidance during high school in developing for example self-regulated learning skills. Moreover, guidance counsellors and teachers could talk to students who are suspected of low behavioural and cognitive engagement about the feasibility and suitability of university education.

The impact of this study lies therein that based on a person-centered approach we showed the value of different dimensions of engagement and showed that a student's specific engagement profile also affects how well he or she performs in university. Secondary school teachers could use this information to address specific shortcomings in engagement if these are clearly visible in their students. If this is not the case, then at least teachers can remind themselves to pay attention to addressing and increasing students' behavioural, cognitive, and intellectual engagement. This could lower the risk of students facing a difficult transition or even dropping out in the first year of university.

CHAPTER 6

Secondary school teachers' beliefs and practices regarding university preparation

Based on: Van Rooij, E. C. M. & Jansen, E. P. W. A. (2018). "Our job is to deliver a good secondary school student, not a good university student." Secondary school teachers' beliefs and practices regarding university preparation. *International Journal of Educational Research, 88,* 9-19. DOI 10.1016/j.ijer.2018.01.005.

Abstract

Secondary school teachers could play an important role in preparing students (better) for university, but there is not much knowledge about their actual role. In this study, we were interested in teachers' beliefs regarding university readiness attributes, their practices regarding university preparation, and their role perception regarding university preparation. Framework analysis was applied on interview data from fifty teachers, where the framework was based on the four-key model of college readiness by Conley, which consists of cognitive strategies, content knowledge, learning skills and techniques, and transition knowledge and skills. The results revealed that teachers believed that attributes falling into the category of learning skills and techniques were the most important aspects of university readiness. These beliefs, however, were not in line with teachers' university preparation practices, because these mainly consisted of providing students with information about studying at university (transition knowledge). Although most teachers believed their role involved contributing to university readiness, few teachers had university preparation in mind as explicit goal; instead, most of them mentioned university preparation practices they performed unintentionally. As barriers to university preparation teachers mentioned spending most of their time on preparing students for the national examinations and a lack of knowledge of what universities expect from first-year students. More awareness of the importance of university preparation and collaboration between schools and universities offer potentially helpful resolutions.

6.1 Introduction

High dropout rates in the first year of university education are a global problem. Moreover, in the Netherlands, most students need at least four years to complete a three-year bachelor programme and one out of four students make a wrong choice of degree programme and consequently switch during or after the first year (Inspectie van het Onderwijs, 2017). This is costly for both individual students and the government, which makes improving the success rates in higher education an important point on the political agenda (Onderwijsraad, 2015). As a consequence, plenty of effort goes out to improving student success in universities and it is a well-researched area. International reviews provide overviews of a plethora of factors – e.g., demographic, cognitive, psychological, and institutional – that are related to achievement and retention in higher education (Richardson, Abraham, & Bond, 2012; Robbins et al., 2004) and a substantial number of studies have been published in the research area of postsecondary student success, especially on first-year success, since research showed that how well a student performs in the first year is indicative of success in the continuing years (Hurtado, Han, Sáenz, Espinosa, & Cabrera, 2007; Jansen & Bruinsma, 2005). In contrast, not much attention has been given to the phase before the transition, even though a key reason for dropout and delay is that students are not bridging the gap between secondary and university education effectively (Lowe & Cook, 2003). To increase the likelihood that students will experience a successful transition, efforts to contribute to students' university readiness, i.e., university preparation, must be an explicit focus of secondary education, especially in countries with differentiated secondary education systems that direct students early into tracks that guarantee access to certain levels of postsecondary education. We focus on the Netherlands for this study, where students in the highest track of secondary education, literally called preparatory university education (short: pre-university education), need to be ready for university when they graduate. Teachers in pre-university education are usually university-educated themselves and can thus be seen as 'experience experts'. Moreover, they often know their students well, having taught them for several years, which means they potentially play a crucial role in students' university preparation. We investigate whether and to what extent they pay attention to making their students ready for university. We also consider teachers' beliefs about the most important aspects of university readiness and their role perception. These beliefs matter, because they act as guides to thought and

behaviour (Borg, 2001). By accounting for teacher beliefs, we seek to understand the bases of their practices, which is necessary information if the goal ultimately is to improve their practices (Nespor, 1987) and thereby enhance students' university readiness. To our knowledge, little research addresses teachers' beliefs about their role in preparing students for postsecondary education or their preparation practices in the classroom. This study thus can contribute both to research into the transition to university and to practice. In the theoretical framework, we will discuss current knowledge about aspects of university readiness and about teachers' beliefs and practices.

6.2 Theoretical framework and research questions

6.2.1 Aspects of university readiness

The transition from secondary school to university is a difficult one for many students. Lowe and Cook (2003) found that in a sample of first-year students at a university in the United Kingdom one out of four to one out of three students faced considerable difficulties in adjusting to postsecondary education. An important reason for adjustment issues concerns the difference between the heavily regulated secondary school learning environment on the one hand and the university environment that makes a strong appeal to a student's self-regulation capacities on the other hand, in combination with a significant increase in amount and complexity of study content. Much research into first-year success confirmed that a substantial number of students struggle with time management and self-regulation, especially in the first semester (e.g., Haggis, 2006; Van der Meer, Jansen, & Torenbeek, 2010). These adjustment difficulties can cause academic problems, such as underachievement or even dropout, and psychological problems, like depression (Leung, 2017; Lowe & Cook, 2003). What also makes the transition challenging is that many secondary school students do not know what to expect or have unrealistic expectations about university in general (Heublein et al., 2017; Smith & Wertlieb, 2005) or about the specific degree programme they have chosen to pursue (De Buck, 2009), which creates academic and social challenges during the transition, with the accompanying high levels of stress (Friedlander, Reid, Shupak, & Cribbie, 2007).

A better preparation for university during secondary education could make the transition less challenging. To prepare students, teachers need accurate

conceptions of what it means to be ready for university. Little research has investigated teachers' beliefs about college readiness, though Kirst and Bracco (2004) showed that secondary school teachers held different conceptions of college readiness than what college professors expected. Secondary school teachers tended to think graduating from secondary school implied college readiness, whereas professors expected students to master the content knowledge taught in high school but also to possess sufficient learning skills, such as the ability to deal with large amounts of content. These skills are not an explicit part of the high school curriculum, so they are not automatically being mastered during high school. Biology teachers in a qualitative case study by Friedrichsen (2002) saw the following aspects as part of college readiness: being able to think critically and outside the box; having study skills, laboratory skills and confidence; and being able to take tests and read scientific texts. Although these aspects are important, they do not present a complete picture of what is needed to be ready for university.

In recent decades, college readiness has received substantial attention in research, especially in the United States. The four-part model of college readiness by Conley (2008) provides a useful overview of readiness aspects. It includes four keys a student needs to be successful in college: cognitive strategies, content knowledge, learning skills and techniques, and transition knowledge and skills. This model can also be applied to university readiness in the Netherlands. The first key consists of key cognitive strategies, or ways of thinking and working that are needed and expected in a college environment, such as analytical thinking, identifying research questions, reasoning, evaluating, precision, and accuracy. In higher education, educational content tends to be more complex than that provided in secondary school; hence, in order to master it, students need good cognitive strategies. Moreover, especially in research universities like those in the Netherlands, course content is highly research-based, requiring students to read academic articles and to design their own research proposals. This task demands thinking skills. The second factor Conley (2008) refers to is key content knowledge, or the mastery of knowledge and skills pertaining to the core subjects and an understanding of the structure of knowledge in these subject areas. For English for example, key skills include writing and presentation skills. As a third factor, a prospective university student must possess key learning skills and techniques. These academic behaviours or beliefs include time management skills, study skills, persistence, motivation, and self-efficacy. The importance of this factor becomes particularly clear when considering the difference between

the externally regulated secondary school environment and the freer college environment that expects substantial independence from students and covers more content more quickly. Finally, the fourth factor refers to key transition knowledge and skills, or information that students need to get into college and then navigate its environment. In particular, they need financial knowledge, to understand the costs and financial aid available; cultural knowledge, to recognize the prevalent norms and values in college; and procedural knowledge, to perceive how the admission process works. These transitional skills are especially pertinent to a student's choice of a degree programme.

We chose to use Conley's model as an overview of university readiness, because in contrast to theories of student success in higher education such as the ones by Tinto (1993) and Astin (1999), or overviews of important correlates of student success such as those by Richardson et al. (2012) and Robbins et al. (2004), this model focuses explicitly on what is needed *before* a student makes the transition. Related to this, unlike these other models or overviews, Conley's model includes transition knowledge and skills, which students need to make an adequate choice of what degree programme they are going to pursue. This aspect is crucial, because in the Netherlands, many students switch programmes because they have chosen a programme they are not satisfied with (Inspectie van het Onderwijs, 2017). By switching programmes, a student usually loses a year. Thus, we apply this framework of college readiness to investigate which factors secondary school teachers in the Netherlands believe are important for their students to be a successful in university, leading to the first research question:

1. What are teachers' beliefs about aspects of university readiness?

6.2.2 Teachers' university preparation practices

Little research focuses specifically on how teachers prepare students for postsecondary education (McPhail, 2015), though some research suggests that secondary school teachers play a role. Smith and Zhang (2008) reported that students rated secondary school teachers more helpful than counsellors in preparing them for postsecondary education, which could be a result of the many students that each counsellor advises and the little time for each student. Another reason may be that the counsellors do not know the students as well as the teachers do. Moreover, in a qualitative study, Reid and Moore (2008) found that first-generation urban college students indicated that teachers helped them prepare academically for college and served as trusted sources of information.

Last, research has shown that university students' perceptions of their preparation during secondary school, specifically time management ability and study skills, related positively to their subsequent study behaviour and achievement in the first year of university (Jansen & Suhre, 2010). These studies, however, do not provide much detailed information about what teachers exactly do when preparing students for university, which is why this study aims to map these teacher behaviours and categorise them within Conley's framework. By doing so, we can also see to what extent teachers' beliefs about important aspects of university readiness align with their university preparation practices. The second research question is:

2. How do teachers contribute to their students' university readiness?

6.2.3 The connection between beliefs and practices

Teachers who believe college preparation is part of their role likely pay more attention to it in the classroom, because teachers' beliefs influence their teaching decisions and practices (e.g., Pajares, 1992). For this study, we use Calderhead's (1996) description of beliefs as suppositions, commitments and ideologies. The development of teacher beliefs is a long-term, on-going process that starts during the teacher's time as a student (Lortie, 1975) and continues to be influenced by personal experiences, prior work experiences, and professional development (Ertmer, 2005). Beliefs regarding college preparation in particular might be shaped by the teacher's own college experiences (Friedrichsen, 2002). In the vast research conducted to understand teacher beliefs and their link to teacher behaviour, some research uncovered a strong relationship between teacher beliefs and practices (Kagan, 1992; Nespor, 1987; Pajares, 1992), but studies have also highlighted some inconsistencies (Ertmer, 2005), usually due to contextual factors that prevent teachers from translating their beliefs into practice (Fang, 1996). These contextual factors might include time constraints, curriculum requirements, or external pressures such as having to prepare students for examinations (Ertmer, 2005; Friedrichsen, 2002). To gain insight into the connection between teachers' role perception and their practices regarding university preparation, we ask the following two questions:

3. What are teachers' beliefs about their role in the process of preparing students for university?
4. Do teachers experience barriers that hinder them from attending to university preparation, and if so, what are these barriers, and how might they be overcome?

6.3 Method

6.3.1 Research context

In the Dutch education system, secondary school students attend a level of education on the basis of their abilities. About one fifth of secondary school students follow the pre-university track that we focus on in this study (CBS, 2016b). Students who graduate from pre-university (which takes six years) are allowed to enter university. In 2014, 80 per cent of all pre-university graduates directly entered university (CBS, 2016a); many of the remaining 20 per cent entered professional higher education, which means a change in learning environment that is comparable to the transition to university (e.g., more independent study, fewer contact hours). Moreover, some students take a gap year after graduating from secondary school and then attend university. Accordingly, university preparation is in theory a central goal of pre-university education that is relevant for the vast majority of students.

In the Netherlands, a national curriculum prescribes the learning content for all school subjects that students must master. Students graduate if they pass the mandatory national examinations in their final year of secondary school. The Inspectorate of Education keeps a close eye on students' results at each school, and average examination results are publicly available, suggesting the substantial accountability attached to these examinations. In contrast, there are no guidelines for or evaluation of university preparation. Schools must have a career guidance programme, but each school can make its own decisions about what form this programme takes (SLO, 2016). Guidance counsellors in each school coordinate the career guidance programmes and advise individual students about their choices. In some schools, consultations with the counsellor are mandatory, whereas in others, students pursue the consultations on their own initiative. In response to some recent criticisms of career guidance in Dutch schools, from August 2017 onwards, the Inspectorate of Education also evaluates schools' career programmes, as part of the basic quality criteria they must meet (Bussemaker & Dekker, 2016).

Admission to specific university degree programmes depends on a student's secondary school coursework. For example, to be admitted to a science degree programme, a student must have completed science coursework in secondary school.

6.3.2 Participants

The study participants were 50 teachers who taught, among other grades, grades 11 and 12 in pre-university schools. This selection criterion is pertinent because university preparation is most relevant in the years immediately before graduation. The teachers were employed by 14 different pre-university schools in the Netherlands. As Table 6.1 shows, most teachers were teaching humanities subjects. Female teachers were overrepresented in humanities subjects, and male teachers in science subjects, reflective of the Dutch teacher population (Microsoft, 2017).

Table 6.1 Overview of participants by their secondary school discipline

	Science	Social science	Humanities	Total
Male	13	4	7	24
Female	4	2	20	26
Total	17	6	27	50

6.3.3 Instrument and procedure

A qualitative methodology is an appropriate way to capture people's cognitions (King & Horrocks, 2010), so we conducted semi-structured interviews. The interview protocol consisted of an introduction and 13 questions that addressed the research questions, such as "What are, according to you, important characteristics a student needs in order to be successful in the first year of university?" (university readiness aspects) and "In your lessons, do you pay attention to preparing students for university? If so, how?" (university preparation practices). We purposefully formulated the questions broadly, so that the interviews would not steer participants in any certain direction. Moreover, participants were free to express what 'university preparation' meant, which also reflected their beliefs about it. When needed, interviewers used prompts and probes.

The interviews were held from September 2015 to May 2016 by one of the authors and graduate students trained to conduct such interviews. In most cases, the interviews took place at the school where the participant was employed, in an office or empty classroom. In all interviews, the same interview protocol was used. Before the interview started, participants were asked (and agreed) to permit the interview to be recorded and to acknowledge that everything they said could be used for research purposes. Anonymity was guaranteed. On average, the interviews lasted 35 minutes and 45 seconds; the longest interview lasted more than 56 minutes, and the shortest was about 21 minutes.

6.3.4 Analysis

All interviews were transcribed verbatim. With our research questions in mind, the analysis sought to categorise different types of beliefs and behaviours, find associations between them, and seek explanations. Framework analysis – a systematic process of sifting, charting, and sorting material according to key themes – suits these goals (Ritchie & Spencer, 1994). As detailed in Table 6.2, we followed Ritchie and Spencer's (1994) five data analysis stages: (1) familiarisation, (2) identifying a thematic framework, (3) indexing, (4) charting, and (5) mapping and interpretation. Atlas.ti was used to conduct the analyses.

Table 6.2 Overview of the stages of framework analysis: Description and execution

Stage	Description by Ritchie and Spencer (1994)	Our practices
1. Familiarisation	Becoming familiar with the data and gaining an overview.	We immersed ourselves with the data by reading and re-reading the 50 transcripts and listing recurrent themes that emerged as important.
2. Identifying a thematic framework	Identifying key issues, concepts, and themes and constructing a framework by drawing on research aims and themes arising from the data.	We linked emergent themes to the research questions. In addition, we categorised those pertaining to beliefs about university readiness and practices of university preparation according to Conley's four keys: cognitive strategies, content knowledge, learning skills and techniques, and transition knowledge and skills.
3. Indexing	Applying the thematic framework systematically to the data.	We coded the passages using the framework with emergent themes developed in stage 2. If a passage did not fit the framework, we assigned a new code and thus expanded the initial framework.
4. Charting	Rearranging the data according to the themes and constructing main 'charts' that consist of headings and subheadings from the research questions and developed framework.	In line with our research questions and the framework derived from stages 1–3, we constructed seven charts: (1) readiness beliefs, (2) preparation practices, (3) role perception, (4) obstacles, (5) wishes, (6) background factors influencing beliefs and practices and (7) knowledge influencing beliefs and practices.
5. Mapping and interpretation	Analysing the range and nature of key themes within the charts, mapping and interpreting the data as a whole and searching for patterns and explanations.	Using Atlas.ti, we generated an overview of how many teachers mentioned each theme to obtain an overall pattern of beliefs and practices. We linked university readiness beliefs to university preparation practices, to determine the extent to which they aligned. Role perception beliefs, background factors, knowledge and barriers were linked to practices and can explain why teachers attend to university preparation or not in their classrooms.

6.4 Results

To present the results, we discuss the main themes that emerged from the data related to each research question: teachers' beliefs about university readiness, their university preparation practices, beliefs about the teacher's role in preparation, and possible barriers. We also briefly outline two other themes that arose from the data: teacher background factors and teacher knowledge that influence teachers' practices.

A point of interest was to find links between teacher beliefs about readiness and their preparation practices, so we combined the results for research questions 1 and 2 together in Table 6.3. The left-hand column summarises aspects of university readiness most often mentioned by teachers and the percentage of teachers who mentioned it. The second column identifies the relevant key category of college readiness according to Conley's model, and then the third column reveals the university preparation practice that corresponds to this readiness aspect, along with what percentage of teachers indicated they attended to this aspect it in the classroom. Finally, we highlighted the discrepancy between readiness aspects and preparation practices, such that a negative symbol indicates fewer teachers mentioned it as a practice than identified it as a readiness aspect.

6.4.1 Teachers' beliefs about university readiness

The three aspects most often mentioned as crucial to university readiness all belonged to Conley's (2007) learning skills and techniques category. The most often mentioned aspect was possessing study skills. Teachers often talked about university students needing to be able to plan to master the vast amount of content required, without external regulation. A second notable aspect was independence, which they considered as both being able to live independently, after moving out of their parents' homes, and a capability to study independently. Perseverance emerged as another crucial aspect; the teachers described the learning content as more difficult than that in secondary school, and they recognised that students would have to pass courses that they would find difficult or disliked. Furthermore, more than one third of the teachers mentioned curiosity, an adequate choice of study programme, content knowledge, and language skills as important readiness aspects. Curiosity constitutes a cognitive strategy in the college readiness framework, an adequate choice of programme reflects the transition knowledge and skills category, and the latter two aspects are forms of content knowledge.

Table 6.3 Themes in university readiness factors and university preparation practices and the percentage of teachers mentioning it as important readiness aspect respectively as an aspect they pay attention to

University readiness aspect	%	Category in Conley's model*	University preparation practice	%	Discrepancy**
Study skills	58	LST	Teaching study skills	44	-
Independence	48	LST	Promoting independence	42	0
Perseverance	44	LST	Promoting perseverance	2	--
Curiosity	40	CS	Promoting curiosity	5	--
Adequate choice of programme	38	TKS	Answering students' questions about degree programmes	68	++
			Asking students about their future plans	50	+
Content knowledge	36	CK	Making sure students master content knowledge	5	--
Language skills	36	CK	Teaching language skills	15	-
Research skills and attitude	28	CS	Teaching research skills and an attitude of inquiry	50	+
Thinking skills (e.g., critical thinking)	24	CS	Teaching thinking skills	48	+
***		TKS	Giving information about studying at university in general	44	+

**Conley's categories are as follows: CS: cognitive strategies; CK: content knowledge; LST: learning skills and techniques; TKS: transition knowledge and skills.*

***In the Discrepancy column, 0 implies virtually no difference in the percentages of teachers who mentioned it as university readiness aspect and as a university preparation practice; - indicates it was more often mentioned as aspect of readiness than as a preparation practice (difference ≥ 10); -- means it was substantially more often mentioned as aspect of readiness than as a preparation practice (difference ≥ 30); + implies it was more often mentioned as a preparation practice than as an aspect of readiness (difference ≥ 10); and ++ means it was substantially more often mentioned as a preparation practice than as an aspect of readiness (difference ≥ 30).*

****Although providing students with information about studying at university in general was mentioned by many teachers as a university preparation practice, being well-informed about university education in general was not mentioned as a readiness aspect, hence this cell is empty.*

6.4.2 Teachers' university readiness practices

All 50 teachers described teacher behaviours they performed regularly in the classroom that they saw as contributing to university readiness. Most of them were implicit though: 46 per cent of teachers said at some point in their interviews that they were not consciously occupied with university preparation. When they engaged in it, they were not aware of contributing to readiness; instead, they became aware of it only during the interview, when primed to talk about university preparation. Only 24 per cent mentioned that some of their classroom practices were intentionally designed to contribute to university readiness.

The most frequently mentioned behaviour – by 68 per cent of teachers – consisted of answering questions from students about specific degree programmes

in the teacher's field. Compared with asking students about their plans for future study, which half of the teachers did, it seemed that quite some teachers tended to leave the initiative to the students to talk about their future after secondary school and the associated possibilities. For example, economics teacher T12 explicitly noted: "[Giving information about degree programmes] is usually demand-driven, so if students come to me with questions I answer them. You don't do it on your own initiative." A mathematics teacher (T11) explained what this interaction usually looks like: "Students approach me very often, like 'what do you think about this [degree programme], and what do you think about this one?' They ask me mainly about science degree programmes. They ask what I know about them, what they have to do, what the access criteria are, that's mostly it."

Half of all teachers sought to promote students' research skills and an attitude of inquiry. Some teachers gave examples of relatively minor efforts, such as letting students practice developing good research questions, whereas others mentioned more substantial notions, such as when a chemistry teacher (T50) revealed: "What we are currently doing as a team of teachers – well, we've only been doing it for a year now – is to shape the transition in a better way and to set up a research line through the curriculum from grade 7 up to 12."

A little less than half tried to promote students' thinking skills, often in relation to analytical and critical thinking skills. Dutch teacher T3 pointed out: "Especially when you are working with texts, that we don't only pay attention to what does it say and what's it about, but also what does it mean, and do we agree, and is the writer's statement correct?"

Two behaviours were each mentioned by 44 per cent of teachers: promoting study skills and giving information about studying at university in general. To promote study skills, teachers mostly dealt with planning skills and how to study large amounts of text, such as by showing students how to write a good summary, as economics teacher T34 explained: "Making a good summary is not that easy. It's more than just taking over the structure of the book and copying. So, I say: 'Later on [in university] you cannot make summaries like these. You will have to ask yourself: what do I know and what not, to which aspects do I have to pay attention, what is the common thread.'" Another common preparation practice was to provide students with information about studying at university in general, to give them an idea of what to expect. Usually, teachers would integrate this kind of information into their everyday teaching. English teacher T24 provided an exemplary quote: "When students complain about the amount of subject matter

they have to study for a test, I tell them: 'This is to prepare you for how you have to do it later [in university]'. And I also tell them that for a test in university I sometimes had to study five books."

Teacher behaviours to promote students' independence, as performed by 42 per cent of them, typically were described as follows: "In grade 12, I don't take them by the hand anymore regarding the subject matter. I do tell them in a timely manner what they have to study, but I'm not going to check it in between. Sometimes this means that they have to study three chapters for one test, and I do not offer these chapters in bite-sized parts anymore" (T24, English teacher).

Finally, the last practice mentioned often enough to appear as a theme (15%) was paying attention to the development of students' language skills, which usually related to requirements that university students would need to read, write, and present in Dutch and English. Thus, "In grade 10 we have them write a research paper now which has to be linked to their coursework, so that they get acquainted with the vocabulary of the discipline they may study in university, because at university much is in English" (T13, English teacher). Training students in language skills represented the practice that exhibited the largest difference across disciplines: Half of the humanities teachers paid attention to language skills, but only six per cent of science and none of the social sciences teachers did so.

6.4.3 Teachers' beliefs about their role in university preparation

Table 6.4 outlines four themes that emerged regarding role perceptions. When teachers indicated if they considered preparing students for university as part of their role, two-thirds of our respondents agreed, with comments such as "I also tell the students: 'I have a responsibility towards you guys to prepare you for what's next'" (T20, physics and chemistry teacher) or "Of course that is a part of the job, you want to deliver them well" (T19, physics and mathematics teacher). The most common elaboration by teachers who did not regard university preparation as part of their job was a belief that by preparing students for the final examinations, they automatically were preparing them for university education (mentioned by 26% of respondents). As French teacher T28 put it: "My responsibility is mainly to make sure they start the final examinations well-prepared and these examinations are preparatory for university education, so that's it." Comparably, mathematics teacher T38 said: "Our job is to deliver a good secondary school student, not a good university student." In contrast, 22 per cent of teachers not only considered university preparation part of their task but explicitly mentioned that it entailed

more than preparing students for the final examinations, which would not give them resources for studying at university, as T19 (physics and mathematics teacher) explained: "Look, as a teacher you could say you don't really care about the subject, I am only going to practice making the examinations for three years. Then maybe they'll do fantastic on the examinations, but if they've actually learned physics, that's the question. And I think we should be there for all those students who will study aerospace engineering or mathematics or physics or chemistry, or whatever degree." Finally, role perceptions related to students' study choice too: 26 per cent of teachers explicitly mentioned that the process of choosing a degree was not part of their responsibility. Geography teacher T25 put it like this: "I think it [providing guidance for the choice of a degree programme] is really a counsellor's task. I am not sufficiently equipped for that as a teacher."

Table 6.4 Role perception themes

Role perception	Percentage of teachers mentioning it
University preparation is a teacher's job.	66
Preparation for the examinations equals university preparation.	26
Teacher does not play a role in programme choice.	26
Teacher should do more than examination preparation.	22

6.4.4 Barriers to university preparation

Table 6.5 presents themes related to barriers that teachers experienced that hindered them from paying more explicit attention to university preparation, as well as their preferences for improving students' university readiness. In particular, 40 per cent of teachers mentioned that the final examinations undermined university preparation efforts. A main line of reasoning stated that passing the examinations was required to even be eligible for higher education, so preparing students to pass them is the priority. According to German teacher T2, "When they're in the final grade of secondary school, I think as a teacher you should prepare them for the examinations, because these are the entrance ticket to further education. And in this last phase first and foremost we work towards that, because if they don't graduate, they won't make it to university anyway." An analysis of their words and the emotions expressed made it clear that some teachers found this limitation frustrating: "Those examinations are sacred, everything's about them and nobody thinks any further. I see them as a means; they see them as the goal. The goal is: What do you want in your life? But secondary school is disabled in the sense that everything is focused on the examinations, and after that there's nothing. Nobody

thinks past the examinations" (T36, biology teacher). Furthermore, many teachers cited the influence of the Inspectorate of Education, which keeps track of schools' graduation rates and students' grades on the final examinations, then makes these data publicly available. Schools are accountable for their examination results, but not for how students fare in higher education, so as Dutch teacher T15 says: "The examination requirements always hold priority. Bad results will be hold against us. So, we do focus on them a lot." Also the curricula are tied to the examination requirements, such that teachers have little room for 'extras', but "If I would have more time, I could do a lot more. But you always have the issue of having to finish the programme. It really has to be finished in six years. So, there's not much time for other things then" (T50, chemistry teacher).

In a related finding, 38 per cent of teachers mentioned a lack of time in general as an obstacle to university preparation, as Dutch teacher T4 explained: "Well, our lessons are 45 minutes, which means that if you really want to figure something out, or go into depth, you don't have the time for it, because the lessons are too short. I miss that sometimes. Sometimes I think the learning content is very random, while I think that if you want to prepare those children well for university, you need deepening and analysis and whatever, and you need time to achieve that."

A third obstacle, mentioned by more than one third of the teachers, was that they did not know what the universities expected, as Dutch teacher T14 indicated: "But look, if the university would say 'hey guys, we miss this or that', then we could see if we could offer that. At the moment I don't know if that is the case, if I have to change something." Biology teacher T47 shared this doubt and gave an example: "I thought maybe I have to do certain things differently, or pay more explicit attention to some things, but I also think like 'well, what do they [university] expect from me?' So in that sense, yeah, I don't know if it is important to pay more attention to research, because that is more now [in university] than it used to be. What would the university like? I think that is a question that needs to be asked."

Many teachers affirmed that they had specific wishes regarding university preparation. By far the most frequent wish was more coordination and collaboration with universities, which related directly to the perceived obstacle of not knowing what universities expect.

Table 6.5 Barrier themes

Category	Themes	Percentage of teachers who mentioned it
Perceived barriers	Final examinations	40
	Lack of time	38
	Not knowing what universities expect	36
	Students' lack of interest or level	34
	Not all students pursue a degree in the teacher's field	24
Wishes	More coordination and collaboration with universities	46
	More attention to university preparation in general	20
	More information on degree programmes	16
	More attention to promoting students' attitude	8

6.4.5 Other influences: Background factors and up-to-date knowledge

During the interviews, 58 per cent of the teachers referred to their own experiences at university, which clearly influenced their beliefs and practices. For example, mathematics teacher T11 recounted: "During my time at university I learned a lot of research skills and I also transfer them to my students." Furthermore, 24 per cent of teachers talked about their own children's university experiences and how they functioned as triggers, making them more aware of the secondary school teacher's role in university preparation. Thus, teachers' experiences at university and whether they had children attending university constituted important background factors.

Pertinent knowledge that influenced teacher beliefs and practices was the level of familiarity with the current university environment and the degree programmes in the teacher's field. Specifically, 48 per cent of teachers mentioned they remained quite familiar with the degree programmes offered in their field. These teachers also talked more often to students about the available programmes and were better able to answer students' questions. In contrast, the 42 per cent of teachers who explicitly admitted they were not up-to-date on the current programmes referred students to the guidance counsellor with questions about degree programmes.

6.5 Conclusion and discussion

6.5.1 Discussion of main findings

Many students have difficulties coping with the transition from secondary to postsecondary education, so to address this concern, the current study investigated teachers' beliefs and practices regarding university readiness and preparation. First, we considered what teachers perceived as important aspects of university readiness, using Conley's (2014) four categories to classify these aspects. Teachers referred mostly to learning skills and strategies as necessary attributes to be successful in university, specifically study skills, independence and perseverance.

Second, we sought to know whether teachers paid attention to university preparation and how. Many teachers admitted during the interviews that university preparation was not something they thought about consciously, even though all of them could – when asked – identify specific practices that might be seen as university preparation. The preparation practices most often described by teachers involved the category of transition knowledge and skills: Teachers answered students' questions about studying at university and about specific degree programmes, and they asked students about their future plans. Furthermore, teaching research skills and instilling an attitude of inquiry were mentioned by half of the teachers. The sense that teachers did not consciously pay attention to university preparation is in line with our finding that the most frequently mentioned practice resulted from the initiative of the students (i.e., answering their questions). Thus, it appears that university preparation is not high on the agenda in secondary schools or consciously in the minds of teachers.

Furthermore, the combined results regarding the first two research questions revealed that the aspects that teachers mentioned most often as important aspects of readiness were not necessarily the same as the preparation practices they mentioned most frequently. In contrast to research about teacher beliefs (Borg, 2001; Nespor, 1987), teachers' beliefs about aspects of university readiness did not act as guides to their university preparation practices in the classroom. The biggest discrepancy emerged for perseverance: 44 per cent of teachers mentioned it as an important aspect of readiness, but only two per cent tried to encourage its development. We also uncovered notable discrepancies for curiosity, which 40 per cent found necessary but only five per cent addressed it in the classroom. A reason for this might be that these teachers regard perseverance and curiosity as stable student characteristics that they cannot influence, as

suggested by a perceived obstacle for university preparation that 34 per cent of teachers mentioned: students' lack of interest or ability.

Our third research question asked about teachers' beliefs regarding their role in preparing students for university. Two-thirds of the respondents believed university preparation was their job, when asked explicitly. However, we also found vast differences among teachers regarding their role perceptions. Some teachers held strong opinions that university preparation was a crucial goal of secondary school, beyond preparing students for the national examinations; a handful of teachers even referred to the examinations as a burden that they would rather eliminate. However, other teachers did not regard university preparation as one of their tasks, because they thought it was equivalent to examination preparation: They assumed that graduation from secondary school implied the student was equipped for university success.

Finally, we investigated if teachers experienced barriers to preparing students for university and how such barriers might be overcome. At least one third of teachers cited final examinations, lack of time, not knowing what universities expect, and students' lack of interest or ability. Their solutions matched the barriers: They wished for more coordination and collaboration with universities and more information on current degree programmes. Moreover, they wanted more time in general for university preparation, which related to the barriers of both a lack of time in general and the need to devote substantial time to preparing for the final examinations. The desire to pay attention to developing a more positive attitude in students matches the issue of students' lack of interest. Previous research has also shown that teachers' beliefs about a lack of student ability and motivation can prevent those teachers from implementing certain learning or instructional approaches. Roehrig and Luft (2004) and Wallace and Kang (2004) cited this point as the most common constraint to uses of inquiry instruction and complex laboratory assignments. Final examinations and students' lack of interest and ability were barriers that the science teachers in Friedrichsen's (2002) study also mentioned when talking about college preparation.

Two other themes emerged from the data as influences on university preparation: background factors and knowledge. Relevant background factors were the teacher's own experiences with the transition to university and/or having children that attended university. The influence of these factors on whether and how teachers attend to university preparation likely reflects the absence of specific guidelines for university preparation, as well as its absence from the national

curriculum and from teacher education programmes. Thus, teacher preparation practices vary with their own idiosyncratic experiences. Teachers who suffered through a difficult transition themselves devoted more attention to university readiness than teachers who did not remember having had any issues. Teachers' own experiences are subjective, and among older teachers, they also may be outdated, which implies the possibility that teachers give their students biased images. For example, many teachers referred to large lecture halls and professors who did not know their students, but the current university climate is increasingly shifting towards small-group teaching and methods that increase student participation and engagement (Brouwer, 2017). Inaccurate or outdated descriptions of the university environment might not contribute to students' development of realistic expectations. In essence, this issue relates to teachers' lack of knowledge about what universities expect from students and insufficient information about current degree programmes, leaving them with no other option than to draw on their own experiences. Hence, teachers may be 'experience experts' because they have attended university themselves, but this does not necessarily provide them with sufficient knowledge and skills to prepare students for university.

The overall picture of this study makes clear that there are notable differences among teachers in their university preparation practices, and that most practices are not explicit or conscious. Moreover, the link between the aspects that each teacher found important for university readiness on the one hand and the aspects that were part of his or her university preparation practices on the other hand was not always direct or one-to-one. Teachers' university preparation practices are thus not clearly guided by beliefs about which aspects make students ready for university. However, a connection between role perception and university preparation was evident. Teachers who strongly believed university preparation was part of their job more often consciously and explicitly paid attention to it in their classrooms. These teachers often had more up-to-date knowledge about the university environment and degree programmes in their field. Moreover, they were more likely to circumvent barriers, such as by devoting time to it, despite the pressure of having to prepare students for the final examinations.

6.5.2 Limitations and recommendations for further research

We interviewed teachers about their practices, which represents a limitation in two main ways. First, what teachers say they do may not match with what they actually do in the classroom. A more reliable view of teacher practices would

require observations. Second, teachers' university readiness behaviours might not be perceived as such by students, due to the discrepancy between the curriculum delivered and that received. Such a gap is especially likely for implicit practices mentioned by teachers, such as having students engage in their own planning to contribute to the development of study skills they will need in university. If this goal is left implicit, students may not see the connection to their university preparation, in which case it may not contribute to their university readiness. Further research might ask students about their perceptions of teachers' university preparation practices. If by such triangulation a more reliable picture about university preparation is obtained, the next step should be to investigate whether these practices ease the transition, and, if so, which practices are the most helpful. This requires a longitudinal study design that follows a cohort of students from the upper grades of secondary school to the first year of university.

The sample in this study also had its limitations. Teacher participation was voluntary, so any teachers who agreed to participate already may have been more interested in the topic of university preparation, with clearer conceptions about what university readiness entails, and more attentiveness to it in their classroom. This selection bias may have influenced our results, although we also encountered many teachers in our sample who said they were not consciously preparing students for university and others who did not believe it was their job to prepare students for university. Another limitation of this convenience sample was that the distribution of teachers across disciplines was not representative: There were many humanities teachers and few social sciences teachers. We thus cannot draw firm conclusions about possible differences across the disciplines, despite some indications of the presence of such differences. For example, a relatively high percentage of science teachers mentioned developing research skills as a university preparation practice, but language teachers were substantially more likely to spend time developing students' language skills (e.g., writing skills). It would be interesting to pursue a more evenly divided teacher sample, to systematically investigate the possible discipline differences in university preparation.

6.5.3 Implications

The implications for practice that we draw from this study reflect the resolutions and wishes mentioned by teachers. First, more coordination and collaboration between secondary schools and universities is needed. Both these parties are involved in the transition, and they need each other. At a minimum level,

the coordination should consist of mutual information provision, such that teachers receive up-to-date knowledge about university learning in general, what universities expect from first-year students in terms of general knowledge and skills, and degree programmes in their field, because we saw that having attended university themselves is not sufficient for teachers to prepare students adequately. With adequate and up-to-date information, teachers can help their students set realistic expectations about studying and the degree programmes. This latter, subject-specific role is highly relevant for teachers, who, more so than guidance counsellors, can act as 'ambassadors' for their field. This role is in demand and expected from teachers, as shown by our finding that two-thirds of teachers mentioned students coming to them with questions about degree programmes related to the teacher's school subject. Moreover, many teachers expressed positive feelings toward having conversations with students who were considering a degree programme in their field. On the other side, for university lecturers, counsellors, and programme coordinators, it could be useful to obtain a better view of what happens in the final years of secondary education, so that they have a clearer sense of transition challenges students are likely to encounter and can take measures to resolve them, such as by developing a transition pedagogy in their first-year programme (Kift, Nelson, & Clarke, 2010). Coordination and collaboration between schools and universities also should entail providing schools with feedback about how their students are doing. If information about students' progress in university were to flow back, secondary schools could pinpoint and address possible problems. For example, if many students are switching degree programmes, the school would know that it needs to improve the guidance it provides in the study choice process. Some schools already collect these data and keep track of their alumni's progress, but it is not yet a nation-wide habit.

Second, to address the lack of time, it would be helpful to find ways to integrate university preparation into regular lessons. Here, the issue of examinations and national curricula comes into play, because regular lessons focus heavily on this curriculum and on preparing for the examinations. Noting the many critiques we heard of these examinations, e.g., that they fail to reflect what is needed to be successful in university, we perceive a need for a national discussion to think critically about the goal of these examinations and whether they could be better aligned with what students need to be ready for university. This issue is not exclusive to the Netherlands; in the United States, scholars have

noted deep concerns that state-level and national learning standards do not align with college curricula or professor expectations (Smith & Wertlieb, 2005).

Third, many teachers were not consciously aware of their role in university preparation; much of what they did was unconscious and implicit. It can be seen as positive that teachers could easily mention classroom practices that in their eyes would contribute to university readiness, although they did not consciously plan these practices in the light of university preparation. After all, this means that things are happening in secondary school classrooms that contribute to students' readiness for the transition. However, a more conscious approach, i.e., planning and designing activities with the explicit goal of university preparation, would likely improve these practices and thus students' readiness. Moreover, many teachers believed that completing secondary school courses implied a student's readiness for further education, a conception that is also common in the United States (Kirst & Bracco, 2004). Hence, the topic of university preparation needs to become more explicit and prominent, so that all teachers are clearly aware that it takes more than completing secondary school courses to be successful in university and that they could play an important role in preparing their students for the transition.

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CHAPTER 7

Academic adjustment as a pivotal process in the transition from secondary education to university

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Abstract

Considering the pivotal role of academic adjustment for student success in university, it is important to gain insight into how motivational and behavioural factors affect academic adjustment, and the extent to which academic adjustment influences student success. This study of first-year university students investigated how intrinsic academic motivation, academic self-efficacy, self-regulated study behaviour, and satisfaction with the chosen degree programme influenced academic adjustment and how these variables and adjustment affected grade point average (GPA), attained number of credits (EC), and intention to persist. Structural equation modelling showed that academic adjustment was influenced by academic motivation, self-regulated study behaviour, and degree programme satisfaction, which together explained 72% of the variance in academic adjustment. Motivational and behavioural variables influenced GPA and credits indirectly through academic adjustment. Satisfaction with the degree programme predicted intention to persist. These results point to the importance of academic adjustment in predicting university GPA and credits and the pivotal role of satisfaction with the degree programme in predicting intention to persist. Universities could integrate the development of self-regulated study skills – the biggest contributor to academic adjustment – in the first-year programme. Moreover, looking at the importance of students' satisfaction with the programme, communication and collaboration between secondary schools and universities should be enhanced in order to help students to choose a university degree programme that matches their abilities, interests, and values.

7.1 Introduction

Dropout rates in the first year of university are high worldwide. In the Netherlands, where this study was conducted, 33% of first-year university students do not continue to the second year of the programme they initially started (Inspectie van het Onderwijs, 2016). A smooth transition from secondary school to university increases the chances of student success, in terms of achievement and persistence (Lowe & Cook, 2003; Rienties, Beausaert, Grohnert, Niemantsverdriet, & Kommers, 2012). Therefore, it is important for university educators to understand how to improve this transition for students. An effective measure of how well a student has made the transition to university is the level of academic adjustment to this new environment. In this study, we draw on traditional theories of student success (e.g., Tinto (1993) and Astin (1999)) and earlier research on academic adjustment (Baker & Siryk, 1989) and conceptualise academic adjustment as the ability to have successful interactions with the new academic environment and to cope with its academic demands. In other words, it revolves around the fit between the student and the university environment (Ramsay, Jones, & Barker, 2007). To make the concept of academic adjustment more explicit, we follow Baker and Siryk's (1984) categorisation of four aspects of academic adjustment, which are motivation to learn and having clear academic goals, applying oneself to academic work, exerting effort to meet academic demands, and being satisfied with the academic environment. Previous research consistently showed that academic adjustment influences academic achievement (Bailey & Phillips, 2016; Rienties et al., 2012).

This study has two goals. First, we aim to determine which motivational and behavioural variables measured in the first year of university affect students' academic adjustment and success, i.e., grade point average (GPA), number of attained study credits (EC), and intention to persist after three months of study. An important question here is which variables influence student success, either directly or indirectly through adjustment. Second, we investigate the magnitude of the influence of academic adjustment on the three outcome variables. Most research only uses one outcome measure, even though the specific outcome measure chosen may affect the results. Robbins et al. (2004) showed, for example, that the impact of predictive factors differs for achievement and persistence. Moreover, these outcome measures in themselves differ. A student's GPA reflects how well a student performs, whereas the number of credits merely shows

whether a student is passing courses. Persistence is yet another distinct measure of success, in that students with a high GPA and many credits may drop out, whereas students with a low GPA or few credits may choose to persist. The differences in measures of success makes it important to include all of them and investigate whether academic adjustment affects them differently.

The motivational and behavioural input variables on which we focus appear in prior literature as important correlates of student success and academic adjustment in university and will be discussed below.

7.2 Theoretical framework

7.2.1 Academic adjustment influencing student success

Research on student success in higher education has a rich history. The traditional theories of Tinto (1993) and Astin (1999) focus on the interaction between the student and the institution, where Tinto's theory of student attrition includes academic, social, and institutional integration as well as goal commitment and Astin's student development theory revolves around student involvement, which he defines as the energy that a student devotes to the academic experience (Astin, 1999). The common ground lies therein that a student enters higher education with certain personal characteristics, e.g., personality, motivation, and study skills, which change and may even be challenged in interaction with the new educational environment. Successful interaction with this new environment, such as having positive interactions with lecturers and fellow students and being able to handle the increased complexity and quantity of the learning content, then determines whether or not a student is satisfied with the first-year experience and whether he or she obtains good grades, passes his or her courses, and persists to the second year (Astin, 1999; Pascarella & Terenzini, 2005; Sevinç & Gizir, 2014). Successful interaction between a first-year student and the academic characteristics and demands of the university environment can be summarised by the construct of academic adjustment. Prior literature consistently showed the pivotal role of academic adjustment in predicting achievement (Aspelmeier, Love, McGill, Elliott, & Pierce, 2012; Rienties et al., 2012; Wintre et al., 2011) and persistence (Kennedy et al., 2000; Kuh et al., 2006) in higher education. Some studies even reported that the effects of background variables on achievement were indirect, with adjustment as a mediator (Kamphorst et al., 2012; Petersen

et al., 2009). Moreover, academic adjustment explained variance in achievement beyond secondary school GPA (McKenzie & Schweitzer, 2001). Lowe and Cook (2003) found that 20% to 30% of university students experienced considerable difficulty adjusting to higher education, leading a significant number to drop out or underperform. These factors make academic adjustment an important concept when investigating student success.

7.2.2 Correlates of student success and academic adjustment

Because of the aforementioned importance of academic adjustment as a correlate of first-year success, it is useful to know which variables influence adjustment. Robbins et al. (2004) emphasised the importance of combining motivational factors and study skills when explaining academic achievement, and Kennedy et al. (2000) warned against using too narrow a range of variables. We followed this line of thought to explain adjustment and included different motivational and behavioural factors in our model to obtain a more integrative view of adjustment and achievement.

Motivational correlates of success and adjustment

Academic motivation. Meta-analyses on academic achievement showed a consistent relationship between motivation and achievement (Richardson et al., 2012; Robbins et al., 2004). Other studies investigated the link between motivational factors and adjustment. For example, Lynch (2006), and Petersen et al. (2009) reported a positive link between intrinsic motivation and adjustment. Baker and Siryk (1984) showed that achievement motivation was correlated with academic adjustment. Moreover, Baker (2004) showed that lack of motivation related to poorer adjustment to university. Following these findings and the expectation that students who are intrinsically motivated to study a certain topic will find it easier to adjust to an educational environment where they get the opportunity to study this topic, we expected academic motivation to have a direct effect on achievement as well as an indirect one through adjustment.

Academic self-efficacy. According to Robbins et al.'s (2004) meta-analysis, academic self-efficacy is the strongest non-cognitive correlate of GPA. Self-efficacy is a person's perception of the ability to perform adequately in a given situation (Bandura, 1997). Academic self-efficacy in the university context thus refers to a student's confidence that he or she can perform adequately in the university environment. Besides being an important correlate of achievement, academic self-

efficacy relates to effort and perseverance in learning, self-regulation, less stress in demanding situations, and better adjustment to new learning situations (Chemers et al., 2001). McKenzie and Schweitzer (2001) found that the prediction of GPA improved by 12% when academic integration and self-efficacy were added to a model with university entry score as a predictor. De Clercq et al. (2013), who used an inclusive approach that took into account several predictors, also reported that self-efficacy was one of the most powerful predictors of GPA at the end of the first year in university. When investigating persistence as an outcome measure, Kennedy et al. (2000) found no differences in self-efficacy between students who continued their studies after one year and those who did not. Still there is some evidence that self-efficacy could affect persistence, because Willcoxson et al. (2011) found that the opposite of academic self-efficacy, lack of academic confidence, caused students to give up their studies. Examining the relationship between academic self-efficacy and adjustment, several studies showed that self-efficacy, or the comparable concept of academic self-confidence, positively affected adjustment (Chemers et al., 2001; Martin et al., 1999). This finding can be explained by Bandura's (1997) self-efficacy theory, which states that people high in efficacy show more persistence in the face of challenges. The transition from secondary education to university is such a challenge. Moreover, Aspelmeier et al. (2012), who found that self-esteem and internal locus of control had a positive effect on first-year students' academic adjustment, suggested that academic self-efficacy is an important factor to consider in future research on adjustment. We thus hypothesised that academic self-efficacy influences achievement both directly and via adjustment.

Degree programme satisfaction. Although models explaining university success included degree programme satisfaction less often than motivation and self-efficacy, it may be crucial for predicting persistence (Suhre et al., 2007; Yorke and Longden 2007), especially in the Netherlands and many other European countries such as Germany and Belgium, where students entering university immediately start in a specific major. Not being satisfied with the programme is one of the most important determinants of dropping out (De Buck, 2009; Wartenbergh & Van den Broek, 2008). Moreover, satisfaction relates to achievement; Suhre et al. (2007) showed that students who were more satisfied obtained more credits. We know of no research that investigates the relationship between degree programme satisfaction and academic adjustment, but we expect that students who are satisfied can better cope with academic demands. In the first few weeks of the

programme, where students immediately start with several courses specific to the degree programme they chose, students already get a good view of what the programme entails and they can judge the extent to which the programme meets their expectations and the extent to which they are satisfied with the programme. Adjustment to the whole first-year experience, which includes – among other things – adjusting to a new way of learning, to more independency, and to a faster learning pace, however, is a process that takes longer. The rationale here is that when students are satisfied with the programme they chose, the process of adjusting academically may be easier. On the contrary, students who are having doubts regarding whether this specific degree programme matches their interests may be preoccupied with the dilemma of whether or not to proceed with this programme, which may also have a negative effect on their process of adjusting to university. Their doubts about the programme may even transfer into doubts about belonging in university altogether. Thus, we expected degree programme satisfaction to be related to academic adjustment, achievement, and persistence.

Behavioural correlate of success and adjustment

Self-regulated study behaviour. Motivation is an important but insufficient condition to perform well in university. As Robbins et al. (2004) concluded, it is important to include study skills, along with psychosocial variables, in models predicting achievement. Self-regulation is a specifically important skill in the university environment, where students must regulate their own study behaviour. Moreover, students who live independently may have many personal and social demands that compete with academic demands. At this point, behaviour regulation becomes crucial. According to Pintrich (2004), behaviour regulation is part of self-regulation, referring to individual attempts to control one's own behaviour. Important behaviour regulation activities in the academic environment – or self-regulated study behaviour – are effort regulation, time management, and environment management. Effort regulation refers to the ability to control the allocation and intensity of effort, with the goal of doing well in a course; time management involves activities such as making schedules for studying and allocating time for different activities; and environment management pertains to finding the optimal physical conditions for a learning environment, such as avoiding distractors (e.g., social media (Jacobsen & Forste, 2011) or people (Pintrich, 2004)). Effort, time, and environment regulation are among the study skills often connected to achievement (Burlison et al., 2009; Lynch, 2006). A meta-

analysis of the Motivated Strategies for Learning Questionnaire (MSLQ) even showed that of all learning strategies included in the MSLQ, effort regulation and time and study environment management had the highest observed validities for predicting GPA (Credé & Phillips, 2011). In addition, Wintre et al. (2011) reported that first-year students who maintained their secondary school GPA in the first year of higher education had better time management skills than those whose GPA would drop and Hurtado et al. (2007) found that students' time management skills were a significant predictor of academic adjustment. In contrast with university lecturers' expectations, first-year students often do not possess the self-regulated skills that the university environment demands, because they are accustomed to the structured and supervised situation in secondary education (Cook and Leckey 1999). This lack of regulatory skill could cause adjustment problems in university; Abott-Chapman et al. (1992) showed that students with insufficient study skills were at risk of academic adjustment problems. We therefore expected self-regulated study behaviour to influence adjustment and achievement.

Previous achievement as a predictor of success and adjustment

Much research indicated that past achievement is a predictor of university achievement (Bowles et al., 2014; McKenzie & Schweitzer, 2001; Richardson et al., 2012; Robbins et al., 2004; Suhre et al., 2007). However, it is equivocal whether past achievement (i.e., secondary school GPA) also influences academic adjustment at university. It seems reasonable to expect that students with higher grades in secondary education will be better equipped to cope with academic demands and thus adjust to university more easily (Baker & Siryk, 1989; Kaczmarek et al., 1990). However, Wouters et al. (2011) found no relationship between achievement in secondary education and academic adjustment in higher education, so we questioned whether to expect a pathway from secondary school GPA to adjustment in university.

7.2.3 The conceptual model

Figure 7.1 presents a schematic representation of the conceptual model of motivational and behavioural factors influencing academic adjustment and the three measures of student success. We expected academic motivation, academic self-efficacy, self-regulated study behaviour, and satisfaction with degree programme choice to relate to academic adjustment, as well as to the measures of student success – GPA, credits, and intention to persist.

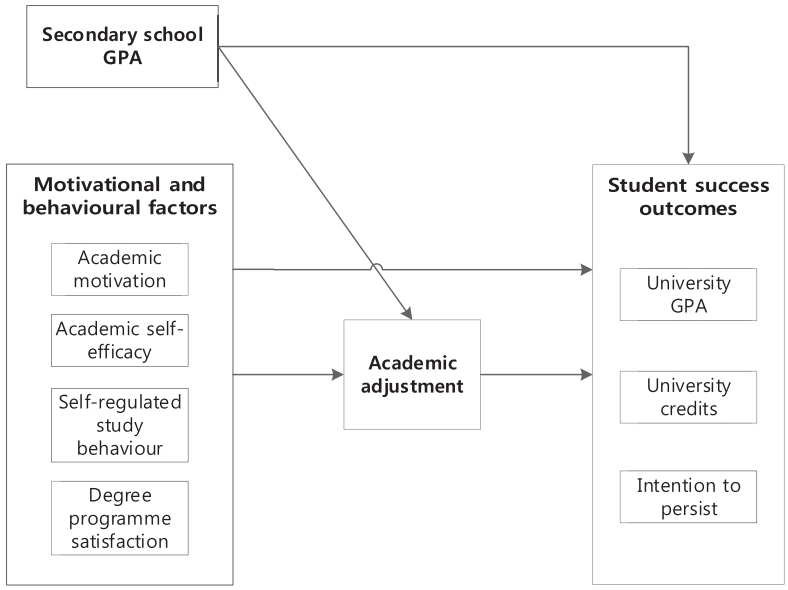

Figure 7.1 Conceptual model of motivational and behavioural factors impacting academic adjustment and student success outcomes

7.2.4 Educational context

There are two characteristics of the Dutch secondary and higher education system that are relevant in this study. First, in the Netherlands, as in many other European countries, the secondary school system is differentiated: From grade 7 onwards, students attend a level of secondary education that matches their capabilities. Pre-university education is the highest of the three existing levels and graduating from pre-university grants access to a degree programme at a research university. For some programmes additional requirements are at play, such as specific subject uptake in pre-university education, but in general the application process is not as intense as for example in the United States. Second, also quite common in Europe, students entering university choose the degree programme they major in before they start.

7.3 Method

7.3.1 Sample

The total sample was a convenience sample that consisted of 243 first-year university students from different research universities in the Netherlands, who completed the questionnaire approximately three months after the start of their programme. Many different degree programmes were represented in the sample, but a large majority of the students were pursuing a social sciences degree (77%), e.g., spatial sciences, sociology, and law, and a smaller number of students were in the humanities (4%) and natural sciences (19%). Women were overrepresented in this study (60%, as opposed to 53% in the population of first-year university students in the Netherlands; Sociaal en Cultureel Planbureau [SCP], 2014). Most students started university after graduating from pre-university education (82%); 14% came from higher vocational education, and the other 4% had switched from another programme at university. Students' average age was 19.13 years (SD 1.57), ranging from 17 to 28 years, hence the sample can be seen as a sample of traditional students. This makes the sample representative, as in the Netherlands 80% of all pre-university students directly continue to university education (Centraal Bureau voor de Statistiek [CBS], 2016). Furthermore, 24% of students can be classified as first-generation university students, students of whom neither of their parents had attended higher education. Among all first-year university students in the Netherlands, the percentage of first-generation students is 33% (Van den Broek et al., 2014).

7.3.2 Measures

Student success outcomes

GPA. Students indicated the average grade they obtained for the courses they had taken in the first quarter of the study year. In the Dutch education system, grades range from 1 to 10, and a 5.5 or higher is required to pass. The students' grades in this sample ranged from 4 to 9, with an average grade of 6.90 (SD = 0.98).

Credits. In addition to their GPA, students reported the number of credits they had obtained in the first quarter of the year.

Intention to persist. We measured students' intention to persist with one question: "Do you intend to finish this degree programme (i.e., the 3-year university bachelor's programme)?"

Academic adjustment

We measured students' academic adjustment with the academic adjustment subscale of the Student Adaptation to College Questionnaire (SACQ) by Baker and Siryk (1984). This subscale consists of 24 questions that involve coping with the academic demands of the university experience. In line with Baker and Siryk's internal consistency measures for the scale, which range from α = .82 to .87, and with more recent studies who used the academic adjustment subscale of the SACQ (e.g., Jones et al. (2015) and Rodríguez-González et al. (2012)), the alpha of this scale in our study was good: .85.

Motivational factors

Academic motivation. We used a measure of intrinsic academic motivation specifically focused on the university environment, i.e., a desire to gain academic knowledge in one's field of interest and to conduct research because one finds it inherently interesting or enjoyable (based on Ryan & Deci, 2000). The 13 items were based on the Scientific Attitude Inventory II (SAI II; Moore & Foy, 1997).

Academic self-efficacy. To measure academic self-efficacy for the university environment, we used 16 of the 33 items of the College Academic Self-Efficacy Scale (CASES; Owen & Froman, 1988). Previous research has shown that these items were sufficient to obtain a reliable measure of academic self-efficacy (Van Rooij et al., 2017). The 16 items were typical behaviours that students need to demonstrate at university, such as being able to understand difficult passages in textbooks and attending class consistently even in a dull course.

Degree programme satisfaction. We measured the extent to which the university students were satisfied with the degree programme they had chosen by averaging the score on two items: "I am satisfied with the programme I chose" and "Looking back, I wish I had chosen a different degree programme" (reverse coded).

Behavioural factor: self-regulated study behaviour

The self-regulated study behaviour scale consisted of the effort regulation and the time and study environment management subscales of Part B of the Motivated Strategies for Learning Questionnaire (MSLQ) (Pintrich et al., 1993). The effort regulation scale had four items, and the time and study environment management subscale consisted of eight items. Credé and Phillips's (2011) meta-analyses of the MSLQ showed that the scales of time and study environment management and effort regulation were so strongly correlated that they may assess the same

construct. Correspondingly, the internal consistency of the complete self-regulated study behaviour scale was good (α = .87). Table 7.1 summarises the measurement characteristics.

Table 7.1 Measurement characteristics of the motivational and behavioural factors

Factor	Sample items	Number of items	Scale range	Cronbach's alpha
Academic adjustment	I keep up-to-date with academic work. I find academic work difficult. (reverse coded)	24	1–5	.85
Academic motivation	I like to gain more academic knowledge in the field of my interest. Looking for new research-based knowledge is boring. (reverse coded)	13	1–5	.88
Academic self-efficacy	(How confident are you that you can perform this task well?) Understanding difficult passages in textbooks. Taking well-organised notes during a lecture.	16	1–5	.74
Degree programme satisfaction	I am satisfied with the programme I chose. Looking back, I wish I had chosen a different degree programme. (reverse coded)	2	1–5	.80
Self-regulated study behaviour	I find it hard to stick to a study schedule. (reverse coded) I usually study in a place where I can concentrate on my coursework.	12	1–7	.87

Previous achievement

We determined academic achievement in secondary school with an item that asked for average secondary school diploma grade. Scores ranged from 6 (satisfactory) to 9 (very good), with an average grade of 7.07 (SD = .72).

7.3.3 Procedure

The Ethics Committee of the university had given approval of the study. All participants received an e-mail invitation to participate in the study. 71% of participants received this e-mail, composed by the researchers, via a coordinator of their programme who was interested in having the first-year students of his or her programme participate in the study and the other 29% received the invitation directly from the researchers. This latter group participated in a previous study a year earlier, when they were still in secondary school, and had given consent to be contacted again for a follow-up study. The e-mail invitation explained the research

purpose and asked the student to complete an online questionnaire. Participation was voluntary. Incentives were allotted among participants who had completed the questionnaire. The response rate was 52%.

7.3.4 Analyses

Due to eleven students having missing values on multiple variables, we based our structural equation model tests on 232 first-year university students. We used Mplus, Version 7, to perform the analyses. First, we inspected the descriptive statistics and correlational matrix to conclude whether certain variables were significantly and substantially related to each other. Second, using these results, we decided which variables to include in the first model, based on the conceptual model with both direct and indirect links from the motivational and behavioural factors to the student success outcomes. Third, we tested this first model and evaluated its goodness of fit based on agreed-upon criteria (e.g., Kline, 2005). Fourth, if the model fit was insufficient, we adapted the model, according to the reported modification indices and theoretical considerations, after which we tested the new model.

7.4 Results

7.4.1 Descriptive results

Table 7.2 presents the descriptive statistics of all factors used in the model. The mean scores on all factors, as well as on secondary school and university GPA, were relatively high and the variances, especially those of academic adjustment and academic self-efficacy, were quite low. There were no significant differences in factor and outcome means between first-generation students and continuing-generation students. We also did not find any significant differences between students who came from pre-university, from higher vocational education, and from another university degree programme.

Table 7.2 Descriptive statistics

Variable	*M*	*SD*	Min–max
Secondary school GPA	7.07	.72	6–9
University GPA	6.90	.98	4–9
University credits[a]	4.42	1.10	1–5
Intention to persist[b]	4.66	.69	1–5
Academic adjustment	3.65	.45	2.27–4.78
Academic motivation	3.46	.59	1.67–5
Academic self-efficacy	3.64	.42	2.63–4.69
Self-regulated study behaviour	5.09	.96	2.33–7
Degree programme satisfaction	4.23	.70	1.33–5

Notes:
[a] *Because degree programmes differ in the possible number of credits a student can attain in the first half of the first semester, credits is an ordinal variable ranging from 1 ("I attained none of the credits that could be attained so far") to 5 ("I attained all of the credits that could be attained so far").*
[b] *Students rated their intention to persist on a five-point scale: 1 = "I will quit this programme", and 5 = "I am determined to finish this programme".*

Table 7.3 shows the correlations between all factors used in the model. The motivational and behavioural variables had higher correlations with academic adjustment than with the three measures of student success, with the exception of degree programme satisfaction, which correlated equally strongly with intention to persist and academic adjustment.

Table 7.3 Correlations between the motivational and behavioural factors and student success outcomes

	1	2	3	4	5	6	7	8
1. University GPA								
2. University credits	.59**							
3. Intention to persist	.22**	.26**						
4. Secondary school GPA	.48**	.33**	.10					
5. Academic adjustment	.44**	.47**	.35**	.27**				
6. Academic motivation	.21**	.16*	.16*	.21**	.28**			
7. Academic self-efficacy	.34**	.20*	.15	.22**	.55**	.22**		
8. Self-regulated study behaviour	.44**	.36**	.01	.37**	.71**	.10	.57**	
9. Degree programme satisfaction	.27**	.27**	.60**	.11	.60**	.17*	.23**	.24*

Notes:
** $p < .01$
* $p < .05$

7.4.2 Path analysis

As can be deduced from Figure 7.1, our conceptual model consisted of many links, between each of the motivational and behavioural variables and academic adjustment and between those and each of the student success outcomes. However, because correlations lower than .25 would likely have resulted in insignificant links in the model, we excluded the hypothesised pathways between academic motivation and GPA, EC, and intention to persist, and those between academic self-efficacy and EC and intention to persist. We then tested this model in Mplus. Goodness-of-fit statistics showed that this model had good fit (X^2 (11) = 14.91, p = .07, X^2/df = 1.36, RMSEA = .04 [confidence interval = .00–.08], CFI = .99, TLI = .98, SRMR = .06). However, many of the pathways were insignificant: Secondary school GPA and academic self-efficacy were not significantly related to academic adjustment; self-regulated study behaviour and satisfaction with the choice of degree programme were not significantly related to GPA; secondary school GPA, self-regulated study behaviour, and satisfaction with the programme were not significantly related to credits; and academic adjustment was not significantly related to intention to persist.

These results implied that many links from the motivational and behavioural variables affected university success outcomes not directly but through adjustment. Therefore, we tested a second model in which we removed all insignificant pathways from the first model. We present this model in Figure 7.2. This model achieved good fit: X^2 (19) = 20.55, p = .36, X^2/df = 1.08, RMSEA = .02 [CI = .00–.06], CFI = .99, TLI = .99, SRMR = .06. All hypothesised links were significant, except the link from academic self-efficacy to university GPA (β = .13 (SE = .06), p = .06). Moreover, university GPA and intention to persist were not significantly related to each other (β = .12 (SE = .07), p = .12) and neither were self-regulated study behaviour and academic motivation (β = .14 (SE = .08), p = .10). The results showed that three motivational and behavioural variables affected two university success outcomes, GPA and credits, through academic adjustment. Self-regulated study behaviour (β = .61), academic motivation (β = .14), and satisfaction with the choice of degree programme (β = .36) had impacts on academic adjustment. Academic self-efficacy was not significantly related to university GPA or academic adjustment, but did correlate highly with self-regulated study behaviour (β = .63), thereby indirectly influencing adjustment and subsequent achievement. In total, 72% of the variance in academic adjustment was explained by the aforementioned variables. Academic adjustment influenced both GPA (β = .38) and the number of

attained credits (β = .50) in university. Secondary school GPA only had impact on university GPA (β = .28). Respectively 29% and 25% of the variance in GPA and credits was explained. The intention to persist was largely influenced by students' satisfaction with the degree programme they had chosen (β = .60).

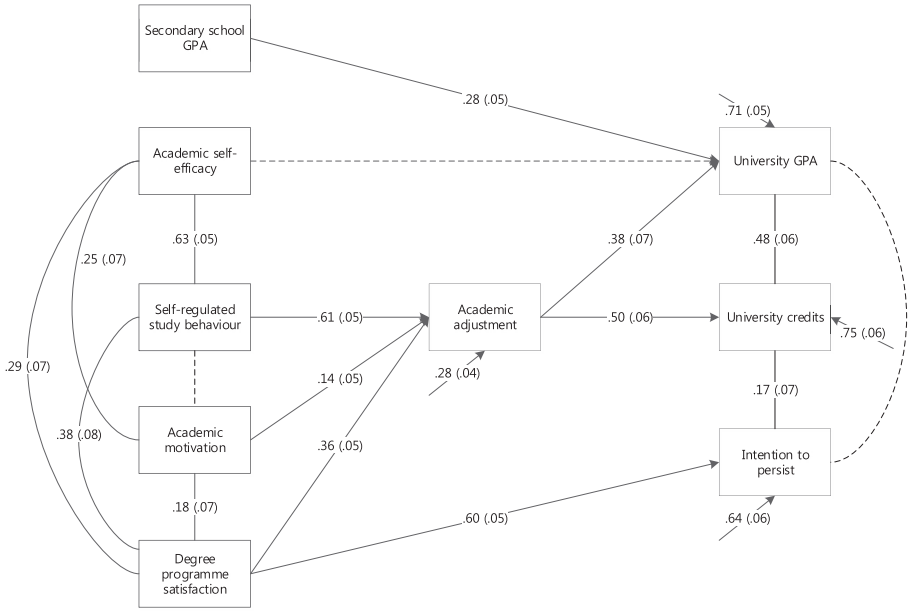

Figure 7.2 Fitted model of motivational and behavioural factors impacting academic adjustment and student success outcomes

Note: Dotted lines represent insignificant pathways

7.5 Discussion

7.5.1 Discussion of the main findings

We investigated which motivational and behavioural variables measured in the beginning of the first year of university affected students' academic adjustment and success (GPA, credits, and intention to persist) and the influence of academic adjustment in predicting these three outcomes. Students who were more intrinsically motivated to gain academic knowledge and to do research, who could effectively regulate their study behaviour, and who were more satisfied with their chosen degree programme had better academic adjustment (i.e., had

more successful interactions with the academic experience and were better able to cope with the academic demands of the university environment). Furthermore, students with better academic adjustment and who had a higher GPA in secondary education had a higher university GPA. In addition, better academic adjustment led to more credits in the first half of the first semester of university. However, whether these students actually intended to persist was a different question: It depended less on the level of academic adjustment and secondary school GPA than on their satisfaction with their chosen degree programme. Our results thus confirmed the importance of academic adjustment as a measure of how successfully the student has made the transition from secondary school to higher education in predicting study results in the first year of university. In addition, academic adjustment was substantially more important in predicting the number of attained credits and university GPA than secondary school GPA. Thus, it is again confirmed that first-year students' experiences, more specifically how they interact with the learning environment, have more impact on their success than their previous results (Kuh et al., 2006).

Motivational and behavioural factors did not influence GPA and credits directly but only through academic adjustment. Thus, effectively regulating study behaviour (e.g., maintaining study schedules, turning off social media when studying), being intrinsically motivated to gain academic knowledge, and being satisfied with chosen degree programme did not necessarily mean students would achieve high grades and obtain all credits. It did, however, increase their chances of being well-adjusted (i.e., able to cope with the academic demands of the new learning environment). Subsequently, this academic adjustment led to a better GPA and more credits. Studies that tested the effects of these motivational and behavioural factors as having only direct effects on achievement may underemphasise the pivotal role of adjustment.

Another important finding was that self-regulated study behaviour exerted the largest influence on academic adjustment of all measured variables. This means that in order to experience a smooth transition, it is very important that students are capable of regulating their study behaviour and less important that they are intrinsically motivated and satisfied with the degree programme. The high degree of self-regulation that university demands is one of the largest differences with secondary school; therefore, students who are good self-regulators will adjust more easily. Another possible explanation is that behavioural factors are more important in explaining adjustment than motivational ones. In this regard, Astin's

claim about student involvement can be applied to academic adjustment as well: "It is not so much what the individual thinks or feels, but what the individual does, how he or she behaves" (Astin, 1999, p. 519). Furthermore, the differences in magnitude of influence on adjustment could be attributable to smaller differences between students in academic motivation than in self-regulated study behaviour.

A surprising result was that academic self-efficacy, widely accepted as a very important correlate of student success (e.g., Robbins et al., 2004), did not affect any of the student success outcomes of our study, nor did it affect academic adjustment. Its most important role in the model was as an influential correlate of self-regulated study behaviour, consistent with previous research indicating high correlations between self-regulation and self-efficacy (Bouffard-Bouchard et al., 1991; Fenollar et al., 2007). Again, a possible explanation is that behavioural factors are more important in influencing adjustment than motivational factors such as self-efficacy and that the differences between students in self-efficacy were rather small. Two other explanations are provided by De Clercq et al. (2017), who found a relationship between self-efficacy and achievement that was less strong than expected in their person-centered study on first-year achievement. As they explained, global self-efficacy, such as the general measure of academic self-efficacy that we used in this study, is not as good a predictor as domain-specific self-efficacy, e.g., self-efficacy in a specific subject or a specific skill, and self-efficacy beliefs are not good predictors of achievement in new learning contexts, such as the first year at university (De Clercq et al., 2017). However, we did find that students who were more confident in their academic skills tended to regulate their effort and manage their study time and environment more effectively than students lower in self-efficacy. Because self-regulated study behaviour is very important in university – where instructors provide little control or structure and more autonomy and responsibility is demanded of students (Pintrich, 2004) – self-efficacy is still an important factor in the transition from secondary to university education due to its influence on behaviour regulation.

Contrary to our expectation, only one variable influenced students' intention to persist, namely, the level of satisfaction with their chosen degree programme. Although this satisfaction also influenced academic adjustment, academic adjustment did not have any influence on intention to persist. Thus, whether a student planned to continue his or her studies after the first year was not related to how well the student could cope with the demands of the academic environment in general, but rather to how well he or she fitted within the specific

study programme. The outcome variable, intention to persist, thus measured a different entity than the outcome variables GPA and credits, which did not directly relate to a specific degree programme. If we had measured intention to persist as a students' intention to stay in university altogether or drop out completely, academic adjustment may have played a role.

7.5.2 Implications

The results indicated the crucial role of academic adjustment in predicting achievement in university. Self-regulated study behaviour, satisfaction with degree programme choice, and, to a lesser extent, academic motivation influenced students' academic adjustment. All these factors can be influenced, both before and after the transition. For example, secondary education could emphasise the development of self-regulated study behaviour. Jansen and Suhre (2010) showed that study skills preparation in secondary school, regarding time management and learning skills, positively influenced university students' study behaviour. We also found a connection between academic self-efficacy and self-regulated study behaviour (e.g., Bouffard-Bouchard et al., 1991). Schunk and Ermter (2000) stated that when either of these aspects is low or lacking, the other aspect cannot fully develop, because they influence each other reciprocally. Therefore, they recommended addressing self-efficacy and self-regulation competence together: Interventions that teach self-regulation skills should contain components that increase students' confidence in their academic skills (Schunk & Ermter, 2000).

University staff should temper their expectations of first-year students' self-regulation skills. Previous studies showed that many first-year lecturers believe students already possess these skills (Cook & Leckey, 1999), and therefore, they do not emphasise the (further) development of these skills, even though they are crucial to student success. Paying attention to study skill development, however, may produce positive effects. Interventions focused on the development of academic skills led to gains in academic achievement (Evans & Burck, 1992). Promoting good study behaviour alone may not be sufficient, in that academic motivation also influenced adjustment. Moreover, many researchers emphasised the importance of combining study skills factors and motivational factors to boost students' achievement (Eccles & Wigfield, 2002; Pintrich et al., 1993; Robbins et al., 2004). Of Zepke and Leach's (2010) ten proposed actions to enhance higher education students' engagement, the first two focus on increasing motivation: (1) enhancing students' self-belief and (2) enabling students to work autonomously,

enjoy learning relationships with others, and feel they are able to reach their own goals. These actions could be a meaningful starting point to increase motivation.

Whereas self-regulation skills and motivation can be positively influenced when the student is already in university, this is to a lesser extent the case with students' satisfaction with their chosen programme. There is not much that can be done when the student has simply chosen a programme that is not what he or she expected it to be and thus does not match his or her abilities, interests, and values. Switching programmes then is a good solution. Because of this large influence we found of satisfaction with the programme on persistence (which is in line with a study by Jansen and Suhre (2010)), it is worthwhile to help prospective students make a good programme choice. Both secondary schools and universities play important roles in this regard. Secondary schools could provide students with the opportunity to get to know the programmes in which they are interested – for example, by having them write a comparative essay of three study programmes, which would encourage them to go in depth to investigate the study programmes and the extent to which they fit the students' individual strengths, interests, values, and learner characteristics. Universities could provide information for prospective students in such a way that their expectations of a programme will be realistic. Information should be transparent about crucial characteristics of the study, such as the curriculum, the degree of difficulty, the level of guidance and availability of staff, the available facilities of the university, and so on.

Last, since both universities and secondary schools are important parties in the transition, it would be beneficial if they would communicate and collaborate more. Schools can prepare students better if they know what happens in the first year at university. First-year lecturers gain understanding of what they can reasonably expect from new students if they know what happens in the upper grades of secondary education.

7.5.3 Limitations and directions for future research

A first limitation of the current study was that we only accounted for academic adjustment, not for other types of adjustment. Although it is the most consistent correlate of achievement compared with the other types (Rienties et al., 2012), measuring social, personal-emotional, and institutional adjustment in addition could be valuable. Second, there were some limitations regarding the sample: It was a convenience sample that consisted of students from several universities and degree programmes without taking these differences into account.

Although interesting for future research, investigating differences between fields or programmes was not the intention of this study and the sample was not sufficiently large to do so. Looking at the relatively high GPA, and the relatively small variance of measures as self-efficacy and academic adjustment that we found, it seems likely that the sample was biased towards the better performing students. We know from research on response bias that it is a familiar problem that higher-achieving students are more inclined to complete surveys than their lower-achieving peers (Sax, Gilmartin, & Bryant, 2003). Therefore, it is important to validate these results with a larger and more diverse sample. In this regard, especially the absence of a link between self-efficacy and academic adjustment would be worthwhile to re-investigate. If the variance between both factors would be increased the model may behave differently. Third, we measured all variables at one point in time, which makes it impossible to detect causal relationships and to map processes. Many of the proposed linkages in the conceptual model could arguably be turned around, e.g., academic adjustment could influence self-efficacy. To determine causal relationships, it would be worthwhile to conduct more longitudinal research that starts measuring motivational and behavioural variables in secondary school and investigates how they relate to adjustment and student success outcomes later in university, like we did in Chapter 5. Moreover, to build on the results of this chapter as well as on the findings reported in Chapter 6 on teachers' university preparation practices, research should investigate whether secondary school teachers' practices that aim to contribute to students' development of self-regulation are effective. Moreover, study choice is crucial; students who are dissatisfied with their chosen programme are at a high risk to quit. Researchers could provide a clear image of what teachers and advisors in secondary schools on the one hand and universities on the other hand currently are doing to help students make suitable choices and how they could improve those choice processes.

CHAPTER 8

Conclusion and discussion

This thesis focused on Dutch students' transition from secondary education to university, as high dropout rates in the first year and research into the first-year experience show that this transition is not optimal. We were interested in (1) what student characteristics contribute to successfully bridging the gap between secondary school and university and, as a result, to achieving success in their first year; and (2) what role(s) secondary school teachers play in students' preparation for university. In this final chapter, we will summarise and discuss the main findings, answer the research questions, elaborate on the most important limitations of this research, provide directions for future research, and present implications for educational practice, in particular for secondary schools. We will end with some concluding thoughts that sum up the main messages of this thesis.

8.1 Summary of the main findings

First, the results of the five studies will be summarised. Then, we will give an integrative overview of the main findings.

8.1.1 Chapter 3: A systematic review of factors related to first-year students' success in higher education

A useful starting point for research into the transition from secondary education to university is an overview of factors that affect first-year university students' persistence and achievement, so that we know what attributes first-year students need to be successful. For the Netherlands and Flanders, both Dutch-speaking countries with a higher education system that is comparable in many regards, such an overview did not exist. Therefore, we conducted a systematic review that asked the following questions:

1. Which factors are important correlates of first-year student success in higher education in the Netherlands and Flanders?
2. Are there any notable differences between the Netherlands and Flanders; between professional education and university education; and based on the outcome variable (GPA, EC, or persistence)?

We looked at the relationships between several independent variables and first-year GPA, number of obtained credits in the first year (EC), and persistence. We found a total of 38 Dutch and Flemish peer-reviewed academic studies – published between 2000 and 2015 – that investigated factors related to one or more of the

outcomes of academic success. Some factors were consistently related to GPA, EC, and persistence, namely secondary school GPA, secondary school science coursework, conscientiousness, intrinsic motivation, academic adjustment, lack of regulation, attendance, and observed learning activities. Consistent relationships with GPA and EC, but not with persistence, were found for self-efficacy, fear of failure, expectancies, and number of contact hours. Looking at the categories of factors, we found that ability factors, prior education characteristics, learning environment characteristics, and engagement were most successful in explaining success, i.e., factors within these categories revealed the most significant relationships with the three outcome variables. Within some categories, the results differed depending on which outcome variable was used. Ability mattered most in explaining student success when the outcome variables were GPA and EC, as did personality. Motivational factors were mainly important in predicting GPA, as were, to a small degree, certain learning strategies. Demographic factors mattered most often when the outcome was EC, and psychosocial factors when the outcomes were EC and persistence. Demographic factors and characteristics of prior education were somewhat more important in Flanders than in the Netherlands. Regarding differences between professional and university education, the gender gap – female students outperforming male students – was larger in professional education, whereas the level of prior education, personality factors, and learning strategy use were more important in university.

Particularly interesting to our research on university readiness was the low number of studies that included secondary school variables beyond secondary school GPA. The studies that did include additional secondary school factors showed that students who had taken up more science, mathematics, and classical languages coursework in secondary school obtained higher GPAs in university, obtained more credits, and were more likely to persist. Moreover, students who had a more positive perception of the fit between secondary education and university obtained more credits. In contrast, how well students conducted career-decisional tasks in secondary school had no effect on success in university.

In summary, this systematic review showed for which factors there is consistent evidence of their influence on student success in Dutch and Flemish higher education. Some of these, i.e., the factors that concern student characteristics, can be seen as important aspects of university readiness.

8.1.2 Chapter 4: Factors that contribute to secondary school students' self-efficacy in being a successful university student

Self-efficacy is widely known as one of the most important predictors of achievement and persistence in university and is also related to the ability to cope effectively with difficult situations such as educational transitions. Therefore, students that are already highly self-efficacious in secondary school are likely to experience a smooth transition from secondary school to university. In this study, we focused on factors that affect students' self-efficacy related to university success whilst still at secondary school, i.e., factors affecting the level of confidence in their ability to successfully perform skills needed for university studies.

The research questions that guided this study were:

1. What is the relative importance of need for cognition, academic interest, behavioural engagement, and out-of-school academic activities in terms of influencing students' self-efficacy in being a successful university student?
2. How much influence is exerted by the background variables gender, level of parental education, and taking science or humanities/social sciences coursework in secondary school?

Structural equation modelling on data gathered from grade 10 and 11 students showed that need for cognition, academic interest, and out-of-school academic activities related directly to self-efficacy. Need for cognition and academic interest exerted the greatest influence. In addition, need for cognition was indirectly related to self-efficacy by its influence on academic interest and out-of-school academic activities. Behavioural engagement was not related to self-efficacy. Background variables influenced some of the factors in the model. Gender played a role regarding out-of-school academic activities, which boys did more frequently, and behavioural engagement, on which girls scored higher. Students from parents who had attended university scored higher on need for cognition and out-of-school academic activities. A student's coursework influenced need for cognition and academic interest, in favour of students who pursued science coursework as opposed to students undertaking humanities/social sciences coursework.

This study made clear that need for cognition is a pivotal construct in determining a secondary school student's self-efficacy as to university success. Looking at the complete model in this study, personality (need for cognition) and motivation (in the form of academic interest) seemed to be more important contributors to a student's belief about whether he or she can 'make it' at university

than actual behaviour in secondary school (behavioural engagement). Moreover, the influence of background factors should be kept in mind, as this implies that certain students – in particular female students without university-educated parents and taking humanities/social sciences coursework – may have a relatively low need for cognition, academic interest, and may hardly be involved in academic activities outside of school. Consequently, they may have low self-efficacy in being successful at university, which may make the transition to university challenging for them.

8.1.3 Chapter 5: The relationship between secondary school students' engagement profiles and the transition to university

As we concluded in the review (Chapter 3), not much research connects students' characteristics in secondary school to outcomes that matter in university. Student engagement is an important predictor of educational outcomes, both in secondary and postsecondary education. Academic adjustment is an important predictor of success in university as well as a useful measure of how well a student has made the transition from secondary school to university. In this study, we identified profiles of grade 12 secondary school students based on three dimensions of engagement – behavioural, cognitive, and intellectual – and investigated how these profiles differed in academic adjustment and achievement in university one year later. The research questions were:

1. Which student profiles emerge in the final grade of secondary school from the indicators of behavioural, cognitive, and intellectual engagement?
2. How do these groups differ one year later in their academic adjustment and achievement in university?

Latent profile analysis using nine indicators – two measures of behavioural engagement, four of cognitive engagement, and three of intellectual engagement – revealed the existence of five distinguishable profiles of grade 12 secondary school students: intellectually highly disengaged (7%); behaviourally and cognitively disengaged (14%); students with overall average engagement (36%); intellectually engaged (22%); and overall highly engaged students (21%). Male students were overrepresented in the behaviourally and cognitively disengaged and in the intellectually engaged profiles, i.e., in the groups in which students' intellectual engagement (need for cognition, academic interest, and self-efficacy in being able to understand university-level content) was higher than their

behavioural engagement (behavioural engagement and self-efficacy in putting in the effort needed to study effectively) and cognitive engagement (the use of learning strategies such as self-regulation). Students doing science coursework were overrepresented in the group of intellectually engaged students and those doing humanities/social sciences coursework were overrepresented in the group of intellectually highly disengaged students.

One year later, in the first semester at university, the pattern that emerged was that the overall highly engaged students were clearly doing best: They had the highest GPA, obtained the most credits, and scored highest on all four academic adjustment aspects (motivation, application, performance, and environment). Intellectually highly disengaged learners had the lowest GPA, obtained the least credits, and experienced the greatest difficulties with the adjustment aspect performance (exerting sufficient and efficient efforts). Behaviourally and cognitively disengaged students scored lowest on overall adjustment, as well as on all adjustment aspects except performance. The differences between these two worst-performing groups and the overall highly engaged group were significant on credit obtainment, overall academic adjustment, and the adjustment aspect performance.

The students with an overall average engagement as well as the intellectually engaged students were both doing reasonably well at university, although we found some small differences between these two groups: On the adjustment aspects application (applying yourself to academic work) and performance (exerting academic efforts that are sufficient and efficient), the students with overall average engagement scored higher than the intellectually engaged, whereas the latter group showed higher scores on motivation (motivation to do academic work) and environment (satisfaction with the academic environment). These differences point towards the existence of clear differences in types of engagement, but also to a certain stability in the level of these different types: The students who were curious, interested, and confident of their intellectual abilities during secondary school were adjusted to university one year later mainly in the sense that they were motivated to be involved in academic work and happy to be in a university environment. On the other hand, the hard-working secondary school students, who were more confident in their ability to put in a lot of effort into their studies than confident in their intellectual capacities, were adjusted to university mainly in the sense that they applied themselves to academic work and exerted sufficient effort.

This study showed the value of distinguishing between different types and levels of engagement in secondary school and the differential effects of these engagement profiles on students' academic adjustment and achievement in their first year at university.

8.1.4 Chapter 6: Secondary school teachers' beliefs and practices regarding university preparation

Secondary school teachers could play an important role in preparing students (better) for university, but there is not much knowledge about this role. In this study, we were interested in teachers' beliefs regarding university readiness attributes, their role perception regarding university preparation, and their practices to realise it. The four research questions were:

1. What are teachers' beliefs about aspects of university readiness?
2. How do teachers contribute to their students' university readiness?
3. What are teachers' beliefs about their role in the process of preparing students for university?
4. Do teachers experience barriers that hinder them from attending to university preparation, and if so, what are these barriers, and how might they be overcome?

Semi-structured interviews were held with 50 teachers who taught the upper grades of pre-university education. Framework analysis was applied, using a framework of university readiness based on the four-key model of college readiness by Conley, which consists of cognitive strategies, content knowledge, learning skills and techniques, and transition knowledge and skills. The results revealed that teachers believed that attributes falling into the category of learning skills and techniques were the most important aspects of university readiness. These beliefs were not in line with teachers' university preparation practices, however, because these mainly consisted of providing students with information about studying at university (transition knowledge), mostly on the students' initiative, i.e., by answering their questions. Although the majority of teachers saw university preparation as an important part of their job, this was not a unanimous viewpoint. A considerable number of teachers felt that preparing students for the national examinations at the end of grade 12 was equal to university preparation, in line with the common conception that being eligible for university, i.e., having graduated from pre-university education, implies being ready for university. Furthermore, university preparation was hardly an explicit goal or focus: Even

though most teachers described classroom practices that could contribute to university preparation (e.g., helping students develop a certain independence or organising specific research activities), they also admitted that often they did not consciously perform these practices with the goal of university readiness in their minds. Factors that caused a small number of teachers to pay explicit attention to university preparation were their own experiences in university, e.g., having had a hard time adjusting to university themselves, and/or having children who were attending university. The barriers for paying (more) attention to university preparation that were mentioned most were the time-consuming preparation for the final examinations and the lack of a clear idea about what universities expect from first-year students.

This study showed that, at secondary schools, there is a need for more awareness about conscious university preparation, as well as for collaboration between schools on the one hand and universities on the other, be it only in the form of mutual expectation management.

8.1.5 Chapter 7: Academic adjustment as a pivotal process in the transition from secondary education to university

Academic adjustment, i.e., interacting successfully with the new academic environment and being able to cope with its academic demands, can be seen as a measure of how well a student has made the transition from secondary school to university. The review (Chapter 3) showed the importance of academic adjustment as a predictor of first-year university students' success. In this study, we aimed for insight into how several motivational and behavioural factors affect academic adjustment and to what extent both academic adjustment and said factors affect three different outcomes of university success, namely GPA, number of obtained credits, and intention to persist into the second year. Three research questions were central in this study:

1. Which motivational and behavioural variables measured in the first year of university affect students' academic adjustment and success?
2. Do they affect student success directly or through academic adjustment?
3. What is the magnitude of the influence of academic adjustment on academic success?

Structural equation modelling on data of first-year university students showed that academic adjustment was influenced by – in order of importance – self-regulated

study behaviour, degree programme satisfaction, and academic motivation. Academic self-efficacy did not affect academic adjustment; its most important role in the model was as a strong correlate with self-regulated study behaviour. Academic adjustment was related to both GPA and credits. Its effect on GPA was even stronger than the effect of secondary school GPA. None of the motivational and behavioural factors was directly connected to GPA or credits; they only affected these outcomes through academic adjustment. Degree programme satisfaction was the only predictor of intention to persist – academic adjustment did not influence this outcome measure.

This study thus confirmed the importance of academic adjustment in predicting students' achievement in the first semester of university, but not in predicting students' intention to stay in the programme. Furthermore, we learned that students who 1) were better at regulating their own study behaviour; 2) were more satisfied with the degree programme; and 3) were more motivated to gain academic knowledge and to do research, adjusted better to the new university learning environment. Hence, we can say that these students very likely experienced a successful transition from secondary school to university.

8.1.6 Integrative overview of the main findings

In this paragraph, the two research questions of this thesis will be answered.

Research question 1: What student characteristics contribute to effectively bridging the gap between secondary and university education and to success in the first year at university?

Considering the combined findings from the different studies in this thesis, we see that many factors play a role in the transition. However, their roles vary depending on the outcome variable and the stage the student is in (secondary education or university), which makes for a complex picture. Chapters 4 and 5 showed that having a high need for cognition and much academic interest were related to 1) high self-efficacy in being successful at university; 2) motivation for academic work; and 3) feeling at home in the university environment. Whereas Chapter 4 showed that behavioural engagement did not affect students' academic self-efficacy before the transition, Chapter 5 pointed out that students with high behavioural as well as high cognitive engagement achieved better at university than students with lower behavioural and cognitive engagement. Additionally, the students who scored high on all types of engagement in secondary school –

behavioural, cognitive, and intellectual – did even better in university than the most curious students (those with top scores on intellectual engagement). This is in line with the findings from our review on first-year student success (Chapter 3), where we saw that various variables indicating behavioural engagement in university (e.g., class attendance, self-study time, regular study behaviour, and completion of assignments) impacted university GPA, number of obtained credits, and persistence to the second year. It seems then, that factors related to curiosity and academic interest motivate students for university studies, make them fit into the university environment, and lead to confidence in their ability to make a success of their university years because they believe in their own intellectual capacities. However, it also seems that factors related to actual behaviour, i.e., behavioural and cognitive engagement, are more important in predicting students' achievement and overall adjustment to university. Chapter 7 even showed that – despite much research that shows otherwise – the motivational factor self-efficacy did not affect achievement or adjustment. The main contributor to academic adjustment was self-regulated study behaviour, again an indicator of behavioural and cognitive engagement. Consequently, the main point is that it is definitely important that students who make the transition to university are curious and motivated and that they believe they can be successful in university, but that they may not come very far unless they also turn that motivation and that self-efficacy into actual self-regulated study behaviour.

The importance of this combination of types of engagement – behavioural and cognitive on the one hand and intellectual on the other – for student success at university is nicely captured in the construct of academic adjustment as operationalised by Baker and Siryk (1989). According to them, academic adjustment consists of four factors: motivation, application, performance, and environment. Motivation and environment, which refer to being motivated to take on academic work and feeling at home in the university environment, mainly relate to intellectual engagement. Application and performance, which refer to putting in the effort to carry out study tasks and perform successfully, can be seen as behavioural and cognitive engagement. In Chapter 5, we saw that the overall academic adjustment score had a large impact on first-year performance, but that students scored differently on these four factors. Besides the types that scored low, average, or high on all engagement factors, there was the secondary school student type that is curious but neither puts/needs to put a lot of effort into schoolwork nor uses/needs to use many learning strategies, as well as the type that works

very hard but lacks this curiosity and urge to gain knowledge. From our results in Chapters 4 and 5 we could also tie background factors to these types of students: The curious but disengaged profile is a typical pattern of male students taking science coursework in secondary school, whereas the engaged but less curious profile more often fits girls who are taking a humanities/social sciences track. As these profiles already become clear in secondary school, secondary schools could contribute to students' university readiness by making sure students get more 'balanced'; i.e., that the curious but disengaged are challenged in such a way that they would have to put in more effort into their schoolwork and learn how to learn and that the engaged but less curious gain genuine academic interest.

Research question 2: What role do secondary school teachers play in preparing students for university?

Chapter 6 focused on secondary school teachers' beliefs and practices regarding university readiness. Interestingly, teachers' beliefs on what it takes to be ready for university were in line with our results as discussed above: They most often mentioned learning skills and attributes such as perseverance as necessary attributes for success at university. This can be summarised as behavioural and cognitive engagement factors, but teachers also often referred to intellectual engagement, or, in their words, curiosity. Nonetheless, most teachers did not pay much attention to the development of these attributes, even if they considered them as important readiness aspects. Fewer than half of all teachers paid attention to developing students' study skills and only five per cent tried to stimulate students' curiosity. What teachers mainly did by way of university preparation consisted of answering students' questions and providing information about studying at university and about specific degree programmes. Neither were most teachers consciously occupied with university preparation; it was not a goal that often crossed their minds. The current role of teachers in their students' preparation for university is then a small, implicit one. When explicitly asked, however, most teachers claimed to find this preparation very important as well as to be willing to do more about it. Their role could be made more substantial and explicit, if only more awareness of the need to better prepare students for university were to be created within secondary schools. Furthermore, there are important barriers to be broken down, such as the (perceived) clash between university preparation and examination requirements and the lack of knowledge about what universities expect from first-year students.

8.2 Discussion

In this paragraph, we will discuss a selection of results that call for further elaboration or that raised interesting questions or dilemmas: the role of self-efficacy in university readiness; the impact of science versus humanities and social sciences secondary school coursework on success in university; and the transition dilemma: Should the transition be made easier or is it a 'healthy change' that students just need to deal with?

8.2.1 The role of self-efficacy in university readiness

Since self-efficacy is known to be one of the most important predictors of academic success in post-secondary education (e.g., Honicke & Broadbent, 2016; Robbins et al., 2012), in Chapter 4, we looked at factors that would contribute to secondary school students' self-efficacy in university success. Following from this, our line of thought in this chapter was that students with high levels of self-efficacy beliefs at the end of secondary school would be more likely to have a successful transition to university and to achieve better in the first year. However, as we showed in Chapter 7 in our study among first-year university students, our structural equation model lacked a significant relationship between academic self-efficacy and academic success: Self-efficacy was not related to university GPA, nor to the number of obtained credits, or the intention to persist into the second year. This was not surprising, as we found in the model that all behavioural and motivational factors were only related to these success outcomes through academic adjustment. However, whereas the other factors included in the model – self-regulated study behaviour, intrinsic motivation, and degree programme satisfaction – were significantly related to academic adjustment, self-efficacy was not. On first sight, these non-significant results surrounding self-efficacy may render our research in Chapter 4 useless, which is why these findings call for more elaboration. First, we will discuss the most likely reason for the insignificant results in Chapter 7. Second, building on this reason and drawing from other research, we will argue why self-efficacy should still be considered a main concept in the transition, and thus also in the preparation phase during secondary school.

A very probable reason for the absence of a link between self-efficacy and the outcome measures in our model in Chapter 7 relates to the presence of a mediating factor: self-regulated study behaviour, or short, self-regulation. Self-efficacy was strongly related to self-regulation, and, in its turn, self-regulation was

the most important predictor of academic adjustment. Much literature points to this mediating role of self-regulation or related constructs. For example, Bouffard-Bouchard et al. (1991) stated that individuals high in self-efficacy perform better due to their better self-regulatory activities and that their self-efficacy beliefs have an even greater effect on self-regulation than their cognitive ability. Chemers, Hu, and Garcia (2001) also attribute the contribution of self-efficacy beliefs to educational achievement to the increased use of cognitive activities (e.g., a more calm and thoughtful approach) and metacognitive skills (e.g., more effective time and environment management and better effort regulation). The meta-analysis and systematic review of Honicke and Broadbent (2016) is particularly interesting in this regard: They reviewed 59 papers (twelve years of research) on the relationship between academic self-efficacy and university students' performance. They specifically focused on the mediating and moderating roles of other cognitive and motivational variables that would shed further light on this relationship and would explain the heterogeneity in the results of individual studies. Their meta-analysis found a moderate correlation between academic self-efficacy and GPA (r = .33, in line with the r = .34 we found in Chapter 7 between academic self-efficacy and GPA). They identified many factors within the self-regulated learning framework that mediated this relationship, such as conscious and deliberate goal setting, effort regulation, and metacognition. In addition, factors related to behavioural or cognitive engagement such as deep processing and academic procrastination played a mediating role. Honicke and Broadbent (2016) concluded that students high in self-efficacy achieve better results in postsecondary education because they use more cognitive and metacognitive strategies and are more engaged in their learning. In a similar way, the moderate bivariate correlations we found in Chapter 7 between academic self-efficacy and GPA and academic adjustment may have disappeared in the model due to the inclusion of self-regulation.

Academic self-efficacy thus acts as a driving force for students to use more effective (self-regulated) learning strategies, which makes it a crucial factor in the postsecondary learning environment where students have to rely on themselves, and it is thus an important aspect of university readiness. Moreover, our model in Chapter 7 showed that academic self-efficacy was linked to academic interest and degree programme satisfaction, which also both affected academic adjustment. These connections are also in line with previous research (e.g., Caraway et al., 2003; Chemers, Hu, & Garcia, 2001; Komarraju & Nadler, 2013). The second reason that it is important that students' self-efficacy is already on a high level when they

start their university studies is because research points to the effect self-efficacy exerts on students' coping strategies. Chemers, Hu, and Garcia (2001) showed that academic self-efficacy affected students' coping perceptions (i.e., whether they evaluated a situation as a challenge or as a threat), which in turn were related to a number of positive outcomes: Students with high self-efficacy beliefs were more likely to see the transition to university as a challenge instead of a threat, which reduced their experience of stress and increased their performance, their adjustment to university, and their satisfaction with university life.

These are powerful reasons why academic self-efficacy should be seen as a crucial asset when embarking on the transition from secondary education to university and why the knowledge we gained in Chapter 4 on which factors influence self-efficacy in secondary school is valuable. It would thus be worthwhile for secondary school teachers and counselors to help their students develop high self-efficacy beliefs. In paragraph 8.5.1 we suggest ways to enhance self-efficacy in secondary school students.

8.2.2 Does science coursework offer a better preparation for university than humanities and social sciences coursework?

In some studies in this thesis, we reported interesting findings regarding the relationship between a student's secondary school coursework and characteristics related to university readiness and success. An understanding of the context is vital here, so before we discuss these findings we will briefly explain how the Dutch secondary school curriculum in pre-university education is designed. After that, we will dig into two issues that arose from our results, namely that science students performed better in university than humanities/social sciences students and that they also consistently scored higher on measures of intellectual engagement.

In the first three grades of pre-university education, grades 7 to 9, all students take up the same coursework. At the end of grade 9 (around the age of 15), students have to choose their coursework for the three upper grades of secondary school. There are four tracks – a track being defined as a group of closely related subjects that aims to offer "general social preparation and personal development, general preparation for higher education, and specific preparation for higher education degree programmes in fields related to the school subjects" (Onderwijsraad, 2011, p. 12-13). There are two science tracks (nature and technology, and nature and health) and two humanities/social sciences tracks (economics and society, and

culture and society). Some subjects are mandatory for everybody (e.g., Dutch and English); some are a mandatory part of a specific track; one or two subjects have to be chosen as additional part of the track; and finally students can choose subjects that belong to another track (although due to time schedule constraints not all combinations are possible). Table 8.1 presents an overview of the subjects that are part of the specific tracks (Qompas, 2017) and the percentages of male and female students per track (VHTO, 2017). Regarding the additional subjects that can be chosen, the offer varies per school, e.g., not all schools offer information technology and philosophy. Many university degree programmes have specific requirements regarding the track a student has completed in secondary education. This is especially the case for science programmes, which can only be accessed with a science track that consists of certain science subjects. In contrast, degree programmes in the humanities and social sciences are often accessible for all pre-university students, regardless the track they graduated in.

Table 8.1 Overview of the four tracks in the upper grades of pre-university education

Track	Percentage of male and female students in 2015/2016 (VHTO, 2017)	Mandatory subjects within the track	Examples of additional subjects that can be chosen as part of the track	Mandatory for everyone
Nature & technology	Boys: 46 Girls: 27	Mathematics B Physics Chemistry	Information technology Nature, life, and technology Biology Mathematics D	Dutch English One second modern language (usually German or French) or a classical language (Latin or Greek) Civic education Arts (or classical cultural education) Physical education
Nature & health	Boys: 19 Girls: 31	Mathematics A (or B) Biology Chemistry	Physics Nature, life, and technology Geography	
Economics & society	Boys: 32 Girls: 31	Mathematics A (or B) Economics History	Geography Management and organisation Social sciences Additional modern language	
Culture & society	Boys: 3 Girls: 11	Mathematics C (or A or B) History	Additional modern language Additional arts subject Social studies Philosophy Geography Economics	

In our review in Chapter 3 we found that students who had taken a science track in secondary education had a higher GPA, obtained more credits, and were more likely to persist into the second year in university. Secondary school science coursework thus seems to put students at an advantage in university.

There is plenty of evidence that corroborates that this is the case: Students who had completed a science track obtained more credits in the first year studying economics at university (Arnold & Straten, 2012); students who took 'a substantial math programme' obtained more credits, had a higher GPA, and were more likely to persist in both humanities and social sciences programmes in university and in biomedical and science programmes (De Wit, Heerwegh, & Verhoeven, 2012); students who had more hours of mathematics in secondary school were more likely to pass the first year of psychology and educational sciences (Fonteyne et al., 2015) as well as more likely to pass the first year in many other fields (Pinxten et al., 2014); and for students who had taken more humanities and social sciences coursework in secondary education the odds of passing the first year were substantially lower in almost all fields than for students who had taken more science classes (Declercq & Verboven, 2010; Rombaut, 2006). Particularly striking about these findings is that science coursework seems to prepare students better for studying a humanities or social sciences university degree than humanities/social sciences coursework. For example, a science track offers more chances of success in an economics degree than the track called 'economics and society' which is intended as preparation for degree programmes in economics (Arnold & Straten, 2012).

Why does science coursework make students more university-ready? One plausible explanation is related to the level and type of mathematics that students take. A science track offers more hours of mathematics and more rigorous mathematics than a humanities/social sciences track, and hours of mathematics instruction and mathematics skills are related to success in postsecondary education, regardless of the field (e.g., De Wit et al., 2012; Fonteyne et al., 2015; Kamphorst et al., 2015).

A second possible explanation is self-selection: Students who perform less well academically may be more inclined to choose a humanities/social sciences track in secondary education, because these tracks are perceived as easier. This perception is quite widespread across society and its existence is also reported by research. For example, Zimmerman et al. (2007) showed that students were overconfident in their ability to understand psychology texts and underconfident when texts concerned chemistry and physics. This difference in perceived difficulty already exists at a young age: Keil et al. (2010) reported that children believed psychological phenomena were easier to understand than natural science phenomena. There seems to be an order in perceived difficulty that goes from hard

to soft sciences, ranging from engineering, medicine, and physics (most difficult to understand) to history, geography, and sociology (easiest to understand) (Hernandez, 2016). Thus, students may choose a humanities/social sciences track due to their perceived easiness. Besides that these tracks in secondary school are perceived as less rigorous, there is also the bigger, and quite controversial, issue of the value of the humanities and social sciences: As higher education is costly and unemployment is relatively larger in humanities and social sciences fields than in STEM fields (Carnevale, Cheah, & Strohl, 2013; VSNU, 2016), people question their value. The fact that one can access a language degree at university without having taken that language at secondary school, study history or economics without even having graduated in those subjects, and study social sciences subjects without any specific requirements as to secondary school coursework: They all confirm the poor image of the humanities and social sciences tracks as not very valuable, and thus make them an unattractive choice.

Another aspect that may play a role in the better performance in many university degree programmes of students who took science coursework in secondary school is the fact that humanities and social sciences subjects in secondary school are not closely related to many humanities and social sciences degrees in university. In other words, these degrees in university are relatively new for everyone, so students who took up humanities/social sciences coursework in secondary school are not at an advantage. Examples are social sciences degree programmes such as psychology and sociology, which do not have secondary school counterparts, and humanities programmes such as languages and cultures that either cannot be studied in secondary school or have a different focus in secondary school (e.g., a relatively high focus on reading, writing, and speaking skills and not so much on linguistics, semantics, literature, etc.).

Fourth, it could be that students in science tracks develop certain skills to a higher extent than humanities/social sciences students – skills that allow them to cope more effectively with the demands posed in higher education (Fonteyne et al., 2015). Scrutinising difficult science concepts, performing precise calculations, solving equations, and applying scientific thinking – typical skills acquired during science classes – could lead to the development of better analytical skills, more scientific literacy, and more perseverance, which can be beneficial in every university degree. Moreover, our interview data showed that science teachers in secondary school paid more attention than teachers in other fields to the development of research skills, an attitude of inquiry, and perseverance and self-

discipline in their students. This could be an indication that the different secondary school tracks call for different learning strategies and thinking skills and thus do not equally contribute to the development of certain skills. This may also be the case for curiosity: In Chapter 4 we saw that science students scored higher on need for cognition and academic interest. Chapter 5 revealed that science students were overrepresented in the group of intellectually highly engaged students and humanities/social sciences students in the group of intellectually highly disengaged students. Again, self-selection may also be at play: More curious students may choose science coursework, because the image of science subjects as being more difficult, more academic, and more rigorous may draw curious students to choose these subjects. Once they are in these tracks, the use of inquiry-based teaching methods and conducting experiments, which is common in science education, may continue to arouse their curiosity and academic interest, while this applies less for students in humanities and social sciences.

These four reasons may contribute to students with a science background being more ready for university, regardless the degree they embark on. Since one of the reasons for the implementation of the tracks in secondary education was that students would be better prepared for higher education by already choosing coursework in line with their future studies, this is not a good situation. In paragraph 8.5.2 we discuss possible measures to increase the rigor and value of the humanities and social sciences tracks as a preparation for a humanities and social sciences university degree.

8.2.3 The challenge of change: Survival of the fittest?

In our qualitative study about secondary school teachers' beliefs and practices regarding university readiness and preparation, some teachers said they thought that the substantial change students undergo when they make the transition to university is 'healthy', that it is an inherent part of the university experience. Consequently, they did not believe that the transition should be flattened. There are good reasons why these teachers do have a point.

First of all, by means of the process of adjusting to university students develop coping mechanisms that will be useful in the future, as they will experience many transitions throughout their lives. Arguably, the transition from university to work which they will experience years later is even more difficult. Dealing effectively with the transition from secondary school to university will give them the confidence they need to also be successful when they start their first 'real' job.

A second reason in favour of leaving the transition be a substantial change is the phenomenon of senioritis, which refers to students' decreasing motivation in the last year of secondary education (Kirst & Venezia, 2004). This phenomenon is particularly common in the United States, where it is said to occur frequently once students have already earned most of their high school credits and have been accepted into college (Kelly, 2012). Even though the situation in the Netherlands is different, since the final examinations are at the end of grade 12, so students feel pressure to prepare for these exams, you could argue for some form of senioritis at Dutch secondary schools, too. A first indication for senioritis is provided by research on motivation and engagement that consistently shows that both deteriorate during secondary school (Gottfried et al., 2016; Lam et al., 2016; Vedder-Weiss & Fortus, 2017). A second indication is anecdotal: Many 12th grade students that we interviewed (data not used in this thesis) talked about being 'tired' of secondary school and needing a change, as they had already spent more than five years at the same school. Third, the preoccupation for the examinations may in fact contribute to senioritis, as this often entails a lot of repetition of content that students have already encountered before. Consequently, students may get bored with school and welcome the idea of an exciting new start at university that will differ substantially from secondary school.

A third argument in favour of leaving the transition what it is – a big leap – is that it can be seen as a form of natural selection: Those who cannot cope with the transition may just not be suitable for university at all. Although this notion of survival of the fittest may sound somewhat cruel, it is in the benefit of both students and institutes that students find out in an early stage, i.e., during the transition, that university is not the best path for them.

There are, however, also arguments in favour of making the transition easier for students. The main one is provided by the bulk of literature that shows that the transition is very challenging and stressful for many students (e.g., Lowe & Cook, 2003), especially because the learning environment differs substantially from the secondary school learning environment and a large number of students have to deal with a great variety of changes simultaneously, e.g., moving out of the parental home and into a new city and meeting many new people. Some good students may drop out or underachieve due to adjustment issues, whereas they would have survived if they had been better prepared for the transition. This would imply an unnecessary loss of talent.

Second, due to the differentiated secondary education system in the Netherlands and the access requirements in higher education, all those who enter university are expected to possess the cognitive capacities for university study and should therefore – in theory – be able to succeed. Hence, all the other aspects such as self-regulation, self-efficacy, interest, and engagement affect the chance of success in actual practice, as we have already seen in the studies in this thesis. In contrast to intelligence, these things can be influenced by educational practices in secondary school and in that way students can be prepared for success in university. Also, in contrast to the notion of survival of the fittest, everyone should be given a fair chance of success, even the ones who might not survive on their own if you threw them in at the deep end.

Third, we saw that a very important cause of dropping out lies in an inadequate choice of degree programme and having unrealistic expectations of university. Inadequate choices will be made over and over again, and unrealistic expectations will be harboured if not enough attention is paid in order to ensure a smooth transition during the final year of secondary education – e.g., information provision and expectation management.

To conclude, in order to prevent unnecessary problems in the transition, such as too much stress and students' expectations not being met, measures in the form of better preparation at secondary school and more collaboration between schools and universities to make the transition somewhat easier are welcome. Suggestions for such measures will be offered in paragraph 8.5.

8.3 Limitations

This thesis reports some new insights regarding the transition from secondary education to university, but there are a number of limitations that should be taken into account when interpreting the findings.

First, we used longitudinal data in only one of the studies, Chapter 5, where students' engagement during secondary school was related to adjustment and achievement in university. All other studies focused either on secondary school students (Chapter 4) or teachers (Chapter 6) or on first-year university students (Chapters 3 and 7). Furthermore, in our longitudinal study, only a relatively small number of university students participated in the data collection and there were some indications that better performing students were overrepresented in

this sample. In order to make more solid claims about students' experiences of the transition and relationships between characteristics present in secondary school students and university success, more longitudinal research using a large, representative sample is called for.

A second limitation, which is related to the first one, is that many of our studies were correlational. In Chapters 4 and 7 we used path analysis and tested hypothesised linkages between factors, but in many cases it could be argued that the paths can be turned around. Examples are the path from academic interest towards self-efficacy (Chapter 4) and the path from degree programme satisfaction towards academic adjustment (Chapter 7). Longitudinal research would also be a solution to this problem.

Third, although throughout the thesis we have included many factors, there are still important factors that remained out of our scope. This is due to our strong focus on student characteristics, more specifically motivational factors and factors related to learning strategies. From our systematic review (Chapter 3), we know which factors that influence first-year success are missing in our studies: the personality factors conscientiousness and procrastination; university learning environment characteristics; factors related to the fit between the secondary school learning environment and the university learning environment; and engagement factors in university such as attendance, self-study time, and regular study behaviour. Adding these factors to our models would likely have increased the amount of explained variance in university success and would thus have provided us with a better picture on what really matters in the transition to university. This is particularly the case for the learning environment variables. We hardly included any of these, with the exception of the coursework a student had taken in secondary school. As a consequence, our conclusions mainly focus on individual student characteristics. Our claims about what kind of learning environments in secondary school would contribute to university readiness are as such mostly based on assumptions. These assumptions were about how certain learning environments would or would not positively influence certain student characteristics, instead of on research results showing that certain aspects of the learning environment have either a positive or negative impact on university readiness. The same limitation applies to the university learning environment. Although our sample of university students was spread out over a number of degree programmes, we did not take into account in which ways the learning environments in these programmes differed from each other. This prevented us

from drawing conclusions about the impact of the first-year learning environment on academic adjustment and achievement.

The last limitation concerns the very specific context of the streamlined Dutch education system, which has consequences for the generalisability of our results to other countries. The first main characteristic of the Dutch system relevant to this thesis is the presence of a level of secondary education that specifically aims to prepare students for university. Only this level of secondary education grants direct access to university and about 80% of its students directly transfer to university after graduation and many more after a gap year. Notwithstanding possible negative aspects of such a highly differentiated school system (e.g., segregation and unequal access possibilities based on socioeconomic status), the presence of pre-university education as a separate track of education can be seen as a luxury position. In contrast to comprehensive secondary education systems such as in the United States, there is no need for career preparation or preparation for vocational education. In theory, this leaves more room for university preparation and makes it easier for teachers, who do not have to shift focus based on different future paths of their students. This unity in the goal of pre-university education, i.e., university-ready students, is central in this thesis. The results are then only directly transferable to education systems with a comparable extent of external differentation in their secondary education, or systems that still have a type of secondary school that aims to prepare for higher education, such as grammar schools in the United Kingdom. For comprehensive systems, the results are, first of all, applicable for advanced courses that are designed for students who plan to attend university, such as Advanced Placement courses in the United States. Second, in comprehensive systems, the results can be used in identifying potential university students. Students who score high on factors that are associated with university readiness – e.g., need for cognition, academic interest, self-regulated study behaviour, academic self-efficacy – should be encouraged to go to university if they are unsure about their plans. In the case of first-generation students especially, they should be guided towards more university readiness by, among other things, increasing their transition knowledge and skills (e.g., knowledge about degree programmes, the university environment in general, and financial issues).

8.4 Directions for further research

8.4.1 Longitudinal research

To address the first two limitations mentioned above and study the transition more thoroughly, longitudinal research is necessary. There are not many longitudinal studies that include measurements both in secondary school and in higher education, but they provide very valuable information. An example is a study by Germeijs and Verschueren (2007) that mapped the study choice process of students in grade 12. This study related the execution of this process to several outcomes in the first year in higher education, namely 1) students' choice actualisation (i.e., whether they actually chose the study they had planned to choose in grade 12); 2) commitment to the chosen study; 3) academic adjustment; and 4) persistence into the second year. They found that students who were more certain of and more committed to their choice in grade 12 were more likely to actualise their choice. Moreover, students who actualised their choice had a higher chance of persisting. In addition, students who did more in-depth exploration of several degree programmes and were more committed to their choice in grade 12 were more committed to their study in the first year of higher education, which in turn decreased the risk of dropping out. Self-exploration (what do I find interesting, what am I good at, what do I find important, etc.) and commitment to the intended choice in grade 12 were related to academic adjustment in the first year, which in turn decreased the odds of stopping or failing. Another longitudinal study that focused on the transition is one by Kyndt et al. (2015). They measured students' motivation five times during the last year of secondary education and the first year of higher education. Their findings showed that during the transition autonomous motivation increased and controlled motivation increased only slightly. As for amotivation, this increased in secondary school and remained stable in higher education, but was significantly lower at the start of higher education than at the end of secondary education. Both longitudinal studies provide useful insights into the transition, the first by showing the importance of grade 12 students' execution of study choice tasks, and the second by shedding light on the developmental trajectories of motivation. Comparable longitudinal studies – i.e., studies that relate secondary school students' characteristics to success in university as well as studies that map the development of relevant factors across the transition – should be conducted that include other factors of importance, such as self-efficacy, self-regulation, academic interest, and engagement. Ideally, the first measurement

should take place before students have chosen their coursework. In Dutch pre-university education, this would be at the end of grade 9. In this way, we could gain insight into whether it is the uptake of science coursework that contributes to a student's need for cognition and academic interest or the student's need for cognition and academic interest that makes it more likely for him or her to choose a science track. It would be interesting to follow these students in higher education until they graduate, so that the results of each consecutive year as well a final outcome measure – e.g., time to graduation – can be taken into account. However, following students for such a long period of time, i.e., a minimum of four years of secondary education and four years of higher education, is rather challenging. It is feasible as long as the students are still in secondary school and the school staff is interested in and dedicated to contributing to such a study. It is then possible for questionnaire administration to be embedded in class once or twice a year. Once the students have made the transition to higher education, however, it becomes increasingly difficult. Students will have to be contacted individually and they will have to keep up their commitment to participating in the study on an individual basis. The longer the longitudinal research, the higher the research dropout rate. Incentives may help, but still the odds are high that the sample will decrease in size and be biased towards the more serious and better achieving students. These challenges explain why many longitudinal studies in educational research are, unfortunately, mostly based on administrative data.

8.4.2 Focus on the secondary school learning environment

The lack of learning environment characteristics in our models was an important limitation of this thesis. In order to provide secondary schools with better recommendations for improving students' university readiness, more research should be conducted about what kind of learning environment contributes to university readiness. First of all, we need to get to the bottom of the science versus humanities/social sciences coursework issue. In what ways and to what extent do these tracks provide students with a different learning environment? Can these differences in learning environment be related to students being less or more ready for and successful in university? In the discussion of our findings above we already described some indications that suggest science coursework prepares students better for any degree at university than humanities/social sciences coursework, but we need to corroborate these findings by conducting a study that is specifically designed to answer research questions related to this issue. This kind of research is

crucial, as its findings may point to serious problems in the design of the tracks in Dutch secondary education.

Furthermore, other learning environment characteristics in secondary education seem to play a role in university preparation, such as the amount of indepencence that students are given. Our study of secondary school teachers' beliefs and practices regarding university practices revealed that some teachers thought that if they did things in ways that resemble the university environment this would contribute to students' readiness. An example is that some secondary schools have been experimenting with school hours – supervised or unsupervised – during which students have to stay in school but can decide for themselves what they want to work on. As this resembles the increased level of freedom students will enjoy in the university learning environment, it would be worthwhile investigating whether these hours actually contribute to students' ability to work independently, to their development of self-regulated study behaviour, and to their self-efficacy in being successful in university.

Another interesting aspect of the learning environment to be investigated would be the extent to which the curriculum is focused on the final examinations. In our teacher study, the examinations were brought forward by many teachers as an obstacle that took away time that could be spent on university preparation – a notion also present in the literature (e.g., Friedrichsen, 2002; Marland, 2003). Does a curriculum with a high final examinations focus prepare students less well for university than a curriculum that is less focused on teaching to the final test? Such a study would provide policy and practice with useful input on the debate regarding the value of the examinations in the light of university preparation.

8.4.3 More qualitative research and more perspectives

In this thesis we gave a voice to secondary school teachers, but not to secondary school students: Regarding the latter, we only gathered quantitative data through questionnaires. Consequently, we know what teachers see as important aspects of university readiness and we have an idea of how they try to contribute to university readiness in their daily teaching, but we are still in the dark as to how students perceive the upcoming transition. From research, we know that many students have unrealistic expectations, but what exactly do these expectations comprise? We also know that many university students find the transition difficult, but does this mean that these students dread the transition beforehand or that they encounter the difficulties only afterwards when they realise that their (maybe

too optimistic) expectations are not met? Moreover, it is clear that choosing the wrong degree programme is an important reason for dropout. A study into the study choice process that builds on the findings of Germeijs and Verschueren (2007) would also be beneficial. In addition to mapping students' execution of Germeijs and Verschueren's (2006) study choice tasks, it would be worthwhile to conduct a qualitative study into students' views and expectations of the degree programme they plan to pursue and to what extent these are in line with the actual programme. In that way, universities would know if changes should be made in their information provision. This type of study could be part of an overall research into the effects of 'matching', i.e., the procedure universities offer all prospective students with the aim of obtaining an optimal fit between the student's capacities and motivation on the one side and the potential degree programme on the other, mostly by way of a questionnaire or an intake interview.

Our teacher study was very limited in the sense that it only revealed secondary school teachers' statements about their practices. The results in this study need to be corroborated by observations, but also by asking students how they experience their actual preparation for university. When teachers say they increase the amount of freedom they give their students throughout the years of secondary education, do students actually notice this? When teachers say they contribute to students' expectation management about university studies by talking about their own experiences in university, are students aware of the importance of such an account or are they just relieved that it takes up some of the class time and hardly pay attention to it? Furthermore, first-year university students could give valuable input regarding university preparation at secondary school. Secondary school is still close to them, so they can clearly remember and relate it to how well they are currently coping with the university demands. For which aspects did school prepare them well, for which aspects were they not prepared at all, and is there anything schools could have done differently that would have prepared them better? Last, a study among first-year university lecturers could shed light on their expectations of and experiences with first-year students. What knowledge and skills do they expect their students to have already mastered at secondary school? What kind of academic attitude do they expect them to have? To what extent do their expectations clash with reality? Schoolteachers experienced that being largely in the dark about exactly what universities expect of first-year students formed a large obstacle in preparing them well. They will have a better concept of what they are preparing their students for if they know more about these expectations

beforehand and also, if they are informed about the actual gaps between first-year lecturers' expectations and the reality of actual freshmen's baggage. Of course, knowing what lecturers expect from new students will also be valuable information for prospective students, as it will help them form expectations about studying at university and may help them in their study choice.

8.5 Implications

In this section we draw on the five studies in this thesis as well as on previous research to give suggestions to secondary schools on how they can help their students get (more) ready for university. Although there is much more to say about this, we will focus on four themes: improving secondary school students' self-regulation; improving university preparation in the humanities and social sciences secondary school tracks; collaboration between schools and universities; and increasing the number of university-educated teachers in pre-university education.

8.5.1 Improving self-regulation

The biggest contributor to students' academic adjustment in the first year of university was students' self-regulatory study behaviour (Chapter 7). Self-regulated learning refers to being able to understand and control your learning environment by means of setting goals, selecting strategies to achieve these goals, use these strategies, and monitor your behaviour and performance with these goals in mind (Schunk, 1996). We saw that students who were more capable of self-regulation adjusted significantly and substantially more effectively to university than those with weaker self-regulation skills, in line with the literature that points out that students higher in self-regulation skills learn better (e.g., Pintrich, 2000). It is important that students already possess these skills when they graduate from secondary school, as they are expected to by university because the skills are hardly ever explicitly taught there within the regular curriculum. Moreover, the literature showed that preparation regarding time management and study skills contributes to students' effective study behaviour in university (e.g., Jansen & Suhre, 2010).

The development of self-regulation

How does self-regulated learning develop? Following self-regulated learning theory, grounded in social-cognitive theory (Bandura, 1997), there are four phases

or levels in the development of self-regulated learning (Zimmerman, 2013). In the first two stages, students rely heavily on external regulation, mostly provided by the teacher. The first stage is observational, where learning is based on observing the teacher who models the self-regulatory behaviour, e.g., while solving an equation on the blackboard, the teacher asks himself or herself questions to check if he or she is not forgetting any of the steps in the process. The second is emulation: Students learn by imitating the teacher's behaviour in a similar task. In this stage, teacher or peer guidance, feedback, and reinforcement is vital. This support can be reduced once students are capable to perform the basic steps. In the last two stages, the balance shifts from external towards internal regulation. The third stage is self-controlled, where students, by means of deliberate practice, learn to master the skill independently in structured settings (i.e., settings designed by the teacher for the purpose of this practice). In this stage, students set their own standards for acceptable performance and encourage themselves to achieve this level of performance by self-talk and feedback. In essence, then, the teacher's role is being internalised. More deliberate practice will lead to the automatisation of this self-controlled behaviour in fixed settings. At the last stage, which is self-regulatory, students are capable of complete self-regulation: They can transfer their learned self-controlled behaviour to other contexts and in other conditions than the structured settings that were designed for practice. In this stage, students are also able to choose appropriate learning strategies and to monitor and – if necessary – adapt their learning activities independently. Necessary conditions of this last level of self-regulation are 1) cognition (learning and thinking skills or strategies); 2) metacognition (knowledge about your own cognition and skills that monitor and control your learning and thinking); and 3) motivation (positive beliefs and attitudes towards learning, including self-efficacy beliefs) (Zimmerman, 2000). All three are necessary and lead to the best academic results, as we also clearly saw in Chapter 5, where secondary school students high in both intellectual engagement (motivation) and cognitive engagement (composed of both cognitive and metacognitive aspects) adjusted and performed best in university.

Teachers' contribution to students' self-regulation development

What is already happening in secondary school regarding self-regulation development? In Chapter 6, teachers did not directly refer to self-regulation as an important attribute of a successful university student, but about half of them did mention study skills and/or independence as important characteristics, both of

them related to self-regulated study behaviour. Approximately 40% indicated that they paid attention to the development of study skills and independence. Common teacher practices described in this sense comprised 1) having students plan their own study activities over a longer time instead of giving homework assignments for each lesson; 2) giving students more autonomy, e.g., in deciding whether or not to attend class but work independently; and 3) checking on homework assignments less frequently or not at all as students grow older. The question is, however, whether these practices contribute to the development of students' self-regulated study behaviour. There are two main issues. First, some students, arguably the ones who are most in need of a self-regulation boost, may take advantage of their newly received freedom in the upper grades of secondary school and procrastinate their (home)work or not do it at all, as it will not be checked by the teacher, and skip class when attendance is based on self-judgment by the student as to whether or not he or she needs the teacher's instruction. Second, almost all interviewed teachers who talked about what they did to give the students more independence confessed that they were experiencing great difficulties with 'letting go'. Many teachers described instances in which they took back control out of fear that students would fail a test, e.g., they would push students to start studying if they noticed that they had hardly been working for it. Interestingly though, a small number of teachers refrained from doing this; they felt some students needed to feel that they had made their own beds and now had to lie in them in order to learn how to do it better next time. We may definitely conclude that improving secondary school students' self-regulation skills is no small thing and a challenging job.

Instructional strategies that can contribute to self-regulation development

What does the literature tell us about teaching strategies that improve students' self-regulation? Schraw, Crippen, and Hartley (2006) conducted a review of 10 years of research into instructional strategies that contribute to self-regulation in science learning and identified six themes within instructional interventions that were effective: 1) inquiry-based learning; 2) collaborative support; 3) strategy instruction to improve problem solving and critical thinking; 4) strategies for helping students to construct mental models and to experience conceptual change; 5) the use of technology; and 6) the impact of student and teacher beliefs. Here, we will focus on inquiry-based learning; strategy instruction to improve problem solving and critical thinking; and the impact of student beliefs, since these three themes relate most closely to other topics in this thesis.

Inquiry-based learning improves self-regulation by stimulating active engagement in the learning process: As inquiry revolves around posing questions, proposing hypotheses, testing them systematically, and evaluating the results, students are forced to use cognitive and metacognitive strategies to monitor their understanding. The role of the teacher is to facilitate this process through scaffolded instruction, modelling reflective thinking, and encouraging students to take an active role in their learning. For inquiry learning to be effective in promoting self-regulation it is crucial that the inquiry activities are authentic. Authentic inquiry, as opposed to simple inquiry, implies that students themselves are involved in all phases of the scientific method (i.e., from generating questions to interpreting the findings) instead of the teacher providing students with pre-formulated questions and pre-set experiments (Chinn & Malhorta, 2002). Authentic inquiry-based instruction leads to improved learning and increased motivation (Anderson, 2002). In Chapter 6, half of the teachers mentioned teaching research skills and an attitude of inquiry. Most of these teachers were science teachers. Some teachers explicitly mentioned teaching practices that can be classified as inquiry learning, although unfortunately not all of these would be classified as authentic inquiry learning. Teachers should be made more aware of the importance of inquiry learning, especially teachers of non-science subjects for which this type of learning is less common. This would contribute to students' self-regulation skills through increasing their cognition, metacognition, and motivation. Also, it should be emphasised that inquiry learning is most effective when it is authentic. Both teacher education programmes as well as professional development courses for teachers can play a role here.

Metacognition contributes to achievement partly independent of intelligence (Veenman, Kok, & Blöte, 2005), which implies that the most intelligent students are not necessarily the students with the best metacognitive skills. Moreover, as we saw in Chapter 5, the students with the highest academic motivation (i.e., the intellectually engaged) were not the ones who showed the best use of cognitive and metacognitive strategies. Veenman, Kok, and Blöte (2005) pointed to two possible problems in students with low use of metacognition: an availability deficiency and a production deficiency. The first is the case when students do not know how to use metacognitive strategies; the latter refers to students who know how to use them but simply do not do so, for example because they have never needed to use them because they have always succeeded in getting good marks without having to put a lot of effort into their learning. In the second

scenario, the production deficiency, it is important that teachers motivate their students to use metacognitive strategies, which can be done by providing them with challenging assignments that force them to use these strategies. As discussed above, assignments that involve authentic inquiry can fulfill this role. In the first scenario, the availability deficiency, teachers can play an important role by teaching metacognitive strategies. There are many methods of metacognition instruction that have proven to be effective. One example is the use of questions that provoke critical reflection during a learning task, which can be anything from reading a difficult text to conducting an experiment (e.g., Chinn & Brown, 2002). Following the stages of self-regulation as described in the beginning of this paragraph, these questions can be asked by the teacher first, and through a process of modelling and scaffolding students can then learn to ask these questions themselves. Other examples of metacognitive strategy instruction are teaching students to check on themselves, set goals, and plan their studies. In a similar way, there are many cognitive strategies that can be taught by explicit instruction, modelling, and scaffolding, such as taking notes, summarising texts, seeking information, critical thinking, and problem solving. From Chapter 6 we know that teachers mainly try to teach metacognitive and cognitive skills by designing a learning environment that should provoke these skills, e.g., by giving students the freedom to plan their own work and increasing the amount of study material they have to learn for a test, but rarely explicitly instruct students about these strategies. A possible reason for this may be that they assume a production deficiency in students, whereas for a substantial number of students an availability deficiency may be the problem. Moreover, teachers may not know how to teach (meta)cognitive strategies. It would be useful to investigate to what extent this is covered in teacher education. If it were found to be lacking or of insufficient quality, measures for improvement could be taken.

Many student beliefs contribute to or undermine the development of self-regulation, such as self-efficacy beliefs, having a growth or a fixed mindset, and epistemological beliefs. We will focus on self-efficacy beliefs here, as self-efficacy was a main construct throughout this thesis and Chapter 7 revealed that self-efficacy contributed to self-regulation, in line with previous research (e.g., Bouffard-Bouchard et al., 1991). Moreover, just as Schraw, Crippen, and Hartley's (2006) review pointed to the importance of paying attention to student beliefs in order to promote self-regulation, Schunk and Ermter (2000) even recommended to address self-efficacy and self-regulation as a whole, because they have a mutual

influence on each other. In Chapter 4 we saw that secondary school students' self-efficacy in being successful in university partly depended on their need for cognition, academic interest, and involvement in out-of-school academic activities, such as reading research news articles in popular journals or on the internet. Need for cognition can be promoted by teachers by making learning content and assignments enjoyable (Elias & Loomis, 2002). Academic interest can be aroused by discussing interesting academic theories and research findings that in some way are connected to students' lives, thereby creating situational interest (Krapp & Prenzel, 2011). In order to encourage this situational interest to develop into the longer lasting form of interest, individual interest, teachers could create situations in which students can generate their own research questions and conduct their own research in a less restrictive learning environment, such that there is much room for autonomy (Hidi & Renninger, 2006; Köller, Baumert, & Schnabel, 2001). This corresponds to bringing authentic inquiry to the classroom. Although this can and preferably should be done throughout secondary education, a perfect opportunity for authentic inquiry related to students' own interests is the research project ('profielwerkstuk') that students have to carry out in the last year of secondary education. This project is part of the examination requirements and has a study load of 80 hours. Students can work individually, with a classmate, or in small groups and can choose their own research topic, although many schools require that the topic is related to one or two school subjects within the student's coursework. The student's teacher of the related school subject acts as the supervisor of the project. Schools have much freedom in how they design this project. Within some schools, teams of teachers of related subjects or even individual teachers differ greatly in how they design, supervise, and evaluate the research project. Although the goals of this research project are that students practice their research skills, higher order skills such as critical thinking, organisational skills, and skills related to independent working, it is not clear to what extent these goals are reached. Data from the teacher interviews in Chapter 6 suggest that some doubt would be justified: The general notion is that teachers see potential in the research project as a means to practice these skills, but that in practice the project is seen by students as well as by many teachers as just another assignment that has to be completed in order to graduate (see also Huijgen, 2014). Moreover, teachers mention a lack of consensus on the content criteria (e.g., level of rigor, type of sources to be used) and evaluation criteria of the project. This is unfortunate, because the research project has great potential to promote students'

need for cognition, academic interest, and frequency of academic activities, which in turn raise students' self-efficacy in their university success, which impacts their self-regulation skills. Moreover, this project may also directly enhance students' self-regulation skills, because it is a form of authentic inquiry and thus requires self-regulation skills. Following from this, it can thus be advised that teachers in the upper grades of secondary school make a joint effort to create a culture among both students and teachers that takes this research project very seriously. Furthermore, it would be beneficial to establish a set of agreed-upon guidelines for the design of this project and its evaluation and adhere to this structure, in such a way that it can actually be seen as a bridge to university, as Huijgen (2014) also proposed.

8.5.2 Taking the humanities and social sciences seriously

Fifty-nine per cent of secondary school students choose their coursework in the upper grades of secondary school based on the field in which they intend to pursue a degree programme in higher education (Onderwijsraad, 2011). This means that students who are interested in studying a language are likely to choose a culture and society track, that many students who plan to pursue an economics degree opt for economics and society, that students interested in the field related to health and biology will choose nature and health, and that students who envision a future in the hard sciences are most likely to take on the nature and technology track. However, in paragraph 8.2.2 we discussed the issue that science coursework in secondary school seems to offer students a better preparation than humanities and social sciences coursework for all degrees in university. This is problematic, as one of the aims of the implementation of the four tracks in secondary school in 1998 was that students would be better prepared for higher education by making it obligatory for them to take up subjects that together comprise a coherent whole of coursework related to the higher education degree students will pursue after graduation (Onderwijsraad, 2011). Following from this, taking on humanities and social sciences coursework in secondary school should prepare students optimally for a humanities or social sciences degree in higher education. Unfortunately, this does not seem to be the case, so in this paragraph, we will describe possible measures that could help to restore this situation.

First of all, changing the structure of the four tracks does not seem desirable. In 2011, the Council of Education investigated the possibilities of going back to zero, three, or two tracks, but concluded that there were no solid reasons for doing

so: After conducting quantitative research among secondary school students and qualitative research among school directors, they reported that reducing the number of tracks would not lead to substantially different choice patterns by students nor would it increase the efficiency of the organisation of education (Onderwijsraad, 2011). In fact, the interviewed school directors pointed to the value of the four-track structure as a good preparation for higher education. Following from this, we would like to argue that it is not so much the structure as the content of the tracks that leads to a suboptimal preparation for humanities and social sciences degree programmes.

One explanation why secondary school science students perform better in university than humanities/social sciences students may be that better achieving students at the end of grade 8 choose a science track. This process of self-selection then leads the weaker students to choose a humanities/social sciences track, triggered by the image of this track as being easier than a science track (e.g., Visser, 2014). This is especially the case for the culture and society track. This negative image may even discourage overall high achieving students who are interested in culture and languages to choose this track, maybe because teachers or parents say this track would be a waste of their academic talent. Their arguments may well emanate from the fact that a science track provides access to more degree programmes – including humanities and social sciences programmes that hardly have any specific requirements. Also, they could arise from the fear that humanities and social sciences tracks will not provide them with sufficient challenge. The first important step, therefore, is to improve the image of humanities and social sciences coursework and emphasise that, although different from science coursework, it is by no means less valuable. This is difficult, as the value of these fields is often put up for debate in society, and for considerable time, it has actively been promoted by organisations such as VHTO, Platform Bètatechniek, and Techniekpact to opt for a science track. This was due to the demand for more highly educated science professionals and the global issue that girls, compared to boys, were less inclined to choose science, even in the case of similar achievement in science subjects (e.g., Wang, Eccles, & Kenny, 2013). These initiatives seem to have been successful, as the number of students choosing science increased (CBS, 2017b). This inevitably led to (image) loss for the humanities and social sciences. What should we do then? As the need for science professionals remains, students should definitely not be discouraged from choosing science, on the condition however, that they are genuinely more interested in science subjects than in humanities/social sciences,

achieve well in science, and seriously consider pursuing a science degree in higher education. Likewise, students who tend towards humanities/social sciences regarding their interests, talents, and future plans should be encouraged to choose a humanities/social sciences track. Guidance counsellors and teachers who aid students in the choice process should then (1) make sure all grade 8 students receive objective information about the tracks, their value, and their future possibilities and (2) verify that students base their track choice on interests, talents, and future plans, and not on public stereotypes or pressure by science campaigns, teachers, and/or parents. Regarding the first, not undermining the value of science, students should explicitly be pointed to the value of humanities/social sciences, for example by discussing the work of humanities advocates such as Nussbaum (2010) who provide many reasons for the value of the humanities; by coming up with examples of important professions for which one needs to be educated in these fields; or by making mention of well-known people in high functions who graduated in these fields (e.g., the current prime minister who specialised in arts in secondary school and completed a university degree in history).

Another explanation for secondary school science track students' better performance in university may be the difference between coursework and learning environment in the science tracks and those in the humanities/social sciences tracks. It is worthwhile to explore possibilities of increasing the academic rigor of humanities and social sciences subjects, not only to reduce the image of these subjects as being easy, but also to have students get used to the difficulty level they will encounter in university, to stimulate the development of persistence and endurance, and to show students that these subjects are academic fields with a rich history of research, just like the natural sciences. By increasing and explicitly showing the academic rigor, the gap between the secondary school subject and the university counterpart will decrease. A clear example are the languages: Many students associate learning French or German in secondary school with cramming vocabulary, learning how to apply grammar rules, and reading books they often find boring. They perceive the end result of the entire subject as being able to make yourself understandable when going on holiday to these countries, often not acknowledging the fact that studying a language in university consists of so much more, e.g., linguistics, semantics, culture, and history. The academic rigor can for example be increased by having students read adapted primary literature, i.e., research papers rewritten in a more accessible form so they are adjusted to a secondary school audience (Falk, Brill, & Yarden, 2008). Research on the use of

adapted primary literature in secondary school showed that it increased students' understanding of the nature of academic research in a specific field, made them ask more higher-order questions, and increased their engagement and inquiry-based thinking (Brill & Yarden, 2003; Baram-Tsabari & Yarden, 2005). Adapted primary literature may thus broaden students' image of the humanities and social sciences as academic fields.

Apart from that, it would be good to have a clear image of which skills and abilities are of vital importance in specific humanities and social sciences university degree programmes and to provide this knowledge to secondary schools, so that they can take action if necessary and possible. The most notable example is the importance of mathematics for being successful in a first-year economics degree in university. As Arnold and Straten (2012) showed, mathematics skills were a key factor in explaining why students who completed the nature and health or nature and technology track, which includes more advanced mathematics, performed better than students who took the economics and society track. Findings like these should be taken very seriously and at least lead to an investigation on whether the curriculum should and could be re-organised in such a way that students in the economics and society track can take advanced mathematics. A related issue is the importance of statistics for academic success in the social sciences (e.g., Fonteyne et al., 2015), which makes it important to embed a substantial amount of statistics in the type of mathematics that is part of the culture and society track.

A final issue is the problem that many humanities and social sciences degree programmes do not have a secondary school counterpart and do not even make an appearance as a topic in secondary school subjects, as opposed to many degree programmes in the natural sciences that revolve around topics that students explore at some point during secondary school physics, chemistry, or biology. Cultural antropology, psychology, sociology, law, communication – these are just a few examples of academic fields that are as new for humanities and social sciences students as they are for science students. This is not only detrimental because it implies a gap between secondary school and university and contributes to the perception of humanities and social sciences coursework in secondary school as being useless (e.g., students may not see the use of a foreign language, geography, and arts when they intend to pursue a law degree), but also because students will not get familiar with these fields unless they encounter them in their own social environment or during their search for information as part of the study choice process. Not having a clear idea of the content of a field increases the

chances of having unclear or unrealistic expectations of the degree programme, which in turn can lead to not being satisfied with the programme once in university and consequently dropping out (Chapter 7; Marland, 2003). To prepare students better for humanities and social sciences university degrees and to familiarise students with the degree programmes within these fields, possibilities for paying attentions to them at secondary school must be explored. These fields could for example be embedded in social studies ('maatschappijwetenschappen'), a relatively new subject in Dutch pre-university education and regrettably only available as an elective in some schools. Questionnaire results showed that this subject is quite popular: Many students in schools who do not offer this subject would have liked to choose it (Onderwijsraad, 2011). Moreover, the name itself, that ends with 'wetenschappen' ('sciences'), may already contribute to the image of the humanities and social sciences tracks as also being academic.

Unfortunately, Chapter 6 showed that the final examination requirements as well as teachers' lack of time may function as barriers for doing precisely those things that could contribute to university readiness, as also pointed out in the literature (Marland, 2003). Moreover, humanities and social sciences teachers, especially those who graduated from university a while ago, may not be closely connected to the university anymore and therefore no longer have a realistic idea of the contemporary curriculum nor be up-to-date with the latest research in their field, and thus unable to use this in their teaching. In the next paragraph we will describe possible solutions for this lack of alignment, many of which are already being conducted on a small scale, i.e., by some schools and by some universities.

8.5.3 Collaboration between schools and universities

Essential in any educational transition is that both the delivering and receiving institutions are involved. To enable a smooth transition collaboration is crucial. Three types of collaboration between secondary schools and universities can be distinguished, which vary in intensity: mutual expectation management; alignment; and integrative practices. The first type is necessary for all students (and teachers) and the second and third ones are desirable for all, but specifically useful for certain groups of students. In line with the goals of this thesis, we will mainly focus on secondary schools when discussing ideas for collaboration, but of course many initiatives can be taken – and some are already being taken – by universities, in particular by first-year university lecturers or programme coordinators.

Mutual expectation management

Teachers do not know what universities expect from first-year students (Chapter 6). First-year university lecturers may also have no clear view of what happens in the last years of secondary school, not only regarding content knowledge and skills, but also regarding the promotion of learning skills and academic attitude. Without having a clear idea of what is happening on the other side, it is hard to take students' educational future or history into account when teaching, which hinders schoolteachers from adequately preparing their students and makes it difficult for university lecturers to build effectively on previous knowledge and skills. The guidance counsellor at secondary school can play a role in making sure teachers remain updated on the university environment. He or she could, for example, give yearly presentations about relevant changes at university, such as developments regarding the binding study advice and matching procedures; but also about changes in the offer of degree programmes, e.g., the merging of separate language and culture programmes into a broader European languages and cultures programme, or altogether new degree programmes. Ideally, the guidance counsellor also systematically evaluates how former students are doing in university by collecting data regarding the number of students who drop out or switch programmes. If these numbers are relatively high, specific university preparation practices can be intensified. Moreover, schools could assign the role of information broker to one teacher in every discipline. He or she can actively seek information about first-year programmes in that field, keep up regular contact with university lecturers about their expectations, and stay in touch with some former students who are pursuing a degree in that field. He or she can then share this information with the other teachers in the same field on a regular basis. From Chapter 6 it can be concluded that there are definitely teachers who are intrinsically motivated to take on this kind of role – some already do. Universities also facilitate this: In the Netherlands, the University of Groningen, for example, has professional learning communities (called 'DOTs', i.e., teacher development teams) of both secondary school teachers and university teachers and researchers that meet frequently to discuss and share educational developments and materials. The transition from secondary to university education is one of the focus points of these communities (Netwerk Noord, 2017). Furthermore, teachers can be encouraged to visit information days at universities, in particular teachers for whom it has been a long time since they attended university themselves. Visiting such a day once a year may already decrease teachers' feelings of being completely

out of touch with universities and provide them with an updated overview of degree programmes. Money and time at secondary schools will have to be made available for this kind of initiatives, though.

Alignment

Torenbeek (2011) investigated the fit between the teaching approach at secondary school and the one at university and found that students obtained more credits in the first year when they had a positive perception of the fit. An alignment of teaching practices with the goal of creating a fit thus seems beneficial, which is corroborated by studies that reported that the large difference in learning environments is one of the biggest transition challenges for students (e.g., Goree, 2013; Marland, 2003). By increasing mutual expectation management, teachers and lecturers would already have a clearer view of what happens at the other side, and can align their teaching practices accordingly to decrease the gap. Schoolteachers could provide students with less external regulation, give a lecture instead of a regular lesson, and give students university-level content or assignments once in a while. For example, they could have their students read adapted primary literature, as already mentioned in paragraph 8.5.2. A key feature of adapted primary literature is that it maintains the structure and line of reasoning of the academic papers that are adapted (Norris et al., 2009; Phillips & Norris, 2009), which will familiarise students with the kind of reading they will have to do in university, the language of academia. Using adapted primary literature in the classroom, however, does demand a high level of pedagogical content knowledge from teachers and hence may be a challenging endeavour (Yarden et al., 2009). Initiatives in secondary education that contribute to alignment would bring the two levels of education closer together and create more continuity, which is especially important for those students who are low in behavioural and cognitive engagement (specifically in self-regulation) and therefore at risk of a difficult transition.

Integrative practices

Integrative practices are initiatives that integrate a university environment into the last year(s) of secondary school in a more or less intensive way. An example of an intensive integrative practice is dual enrollment, a common programme in the United States that allows students to take college courses while still in high school. The credits earned at college can be added to a student's high school diploma or displayed on a separate certificate. In some cases, this gives them exemptions at

college. Evaluation studies of dual enrollment showed that participation contributes to college readiness: Students who participated in these programmes, regardless of whether they had a low or high SES background, had a higher first-year GPA and were less likely to need remediation courses (An, 2013; Edmunds et al., 2017). In the Netherlands, dual enrollment has not really taken root as yet, but there are some promising initiatives in a comparable direction. An example are web classes for pre-university students that universities offer with the aim of familiarising prospective students with the first-year content of a specific degree programme. At the University of Groningen, such online courses are offered for many programmes and consist of approximately 10 hours of study load, spread out over four weeks. Students read academic texts, complete assignments, and discuss the content with other participants and the teacher of the web class (University of Groningen, 2017b). The content mirrors the actual content in the degree programme. Not all Dutch universities offer such web classes, although they seem a very promising and efficient initiative, especially for degree programmes that are far removed from the subjects that secondary school students are familiar with. Other integrative practices that are already in place are the provision by universities of guidance, facilities, and equipment for secondary school students to conduct their grade 12 research project, as well as the guidance they offer to secondary school teachers on how to supervise and evaluate these projects, for example in the form of workshops (e.g., Radboud University, 2017). Additionally, some schools sometimes invite university lecturers or researchers to give lectures or workshops. Guest speakers contribute to useful educational experiences, especially if they have good pedagogical skills, if their field belongs to the ones that the students are unfamiliar with, and if the lectures closely resemble university lectures (Marland, 2003).

The aforementioned integrative practices that provide students with reasonably authentic university experiences will not only familiarise them with university-level content and give them a realistic impression of what it is like to study at university, but will also aid them in the process of choosing a degree programme by giving them an impression of the kind of content that they will encounter in certain programmes (Dare & Nowicki, 2015). Moreover, in the Netherlands, it can help students who are unsure whether to continue to university or professional education. Students who find out they are not too keen on the complex academic content, the research-based attitude, the high level of independence that is expected, or other aspects of university studies may better choose a professional degree programme – which a little less than ten per cent

of pre-university students do (CBS, 2017a). The problem is, however, that these initiatives for integrative practices do not yet have a large reach. First, for schools in the countryside, far removed from a university city, organising offline initiatives is challenging, e.g., students would have to travel far to attend an information day, course, or lecture at university and it is very time-consuming for university staff to visit such schools. Second, as things stand now, only a handful of talented students in the Netherlands currently follow (online) university courses during their secondary school years. These classes are neither regarded nor advertised as a measure contributing to every student's university readiness, but more as a form of academic enrichment for high-achieving students (e.g., the Pre-University College of the University of Leiden and the U-Talent programme at the University of Utrecht). It seems likely that this will lead to a Matthew effect regarding university readiness: Those who will probably not be facing many transition problems in the first place because they belong to the group of overall highly engaged students (Chapter 5), will get even better prepared by following university courses. Therefore, it would be recommendable to seek ways in which integrative practices would reach all students, for example by making it mandatory for all students in the upper grades to take a short online university course in a topic they are interested in.

8.5.4 More university-educated teachers

In the Netherlands, the two most common pathways to becoming a teacher in the three upper grades of pre-university education are a university bachelor's degree in a discipline closely related to a school subject, followed by a university master's degree in teacher education, or a bachelor and a master of teacher education in a specific school subject at an institute for professional education. (Teaching the three lower grades of pre-university education is also allowed after a university bachelor in a field related to a school subject, followed by a 30 EC educational programme in the third bachelor year, and after completing a bachelor of teacher education in a specific subject in professional education.) Most current upper grade pre-university teachers hold a university diploma, but as these teachers grow older and the number of students in teacher education programmes at universities is declining, the percentage of university-educated teachers is decreasing (KNAW, 2017). The question that needs to be asked, then, is: What does this mean for university preparation at secondary schools? We think there are two main reasons why university-educated teachers are likely to be more capable of university preparation

than their professionally-educated counterparts, although at the same time we must emphasise that these notions are not based on systematic research on differences between professionally and university-educated teachers in their ways of teaching, but based on the differences between professional and university education that we believe impact someone's teaching. Moreover, we do not intend to overgeneralise: Some professionally educated teachers may be perfectly capable of contributing to the development of characteristics in students that are part of university readiness, whereas some university educated teachers may find it difficult to do so. Nonetheless, university preparation may be easier for university-educated teachers.

First, some aspects that are part of university readiness, such as intellectual engagement (academic interest, need for cognition) and the academic attitude (the inquiry-based way of reasoning, critical thinking) are typical ways of being and thinking that need to be modelled. Teachers who have spent at least five years (three bachelor and two master years) in university have been immersed in this modus, which will probably turn it into a characteristic mode of being, also in the classroom. This may include things like asking yourself questions, critically reviewing sources before you use them, correctly citing sources, and converting a random wondering into a research question. These habitudes may not come as natural for teachers who completed a professional education teacher degree. Furthermore, university-educated teachers are more likely to be connected to the academic world, e.g., they are more likely to keep themselves updated on new research in their fields, which they can subsequently share with their students. Besides, they will know where to find academic knowledge and how to do research. This implies that they will also be more capable of supervising students in their research project in the last year of secondary school. Moreover, looking back to the implementations discussed above that may contribute to university readiness, university-educated teachers may find it easier to provide students with the academic rigor that students will encounter at university, discuss the content and value of their subject area as an academic field, create authentic inquiry-based assignments, and use adapted primary literature in the classroom.

Apart from this benefit regarding modelling the academic attitude and sharing and teaching academic knowledge and skills, it will also be easier for university-educated teachers to manage students' expectations regarding university and tell them about degree programmes in their field. Even though these teachers, in particular the older ones, may not be up-to-date anymore about the current teaching methods and range of degree programmes, they can

always share stories about how they experienced the transition, what they liked about university, what they found challenging, what kind of courses they took, what type of assignments were common, and what kind of thinking and working was expected. This role cannot be underestimated, because Chapter 6 showed that among the most common university preparation practices currently done by teachers were answering students' questions about degree programmes at university and providing them with information about the university environment. It is highly doubtful whether teachers from professional education can answer these questions. Furthermore, especially for potential first-generation students it is important to be in contact with people who attended university, as they may not easily meet university-educated people in their own environment.

Consequently, it is vital that urgent measures be taken to increase the number of university-educated teachers. The government has already taken note of this and some initiatives have started or will be started soon, such as 1) increasing the attractiveness for university students to pursue a university-level teacher education degree by lowering the fees; 2) making the entrance requirements for teacher education more flexible (e.g., offering personalised routes based on an intake for second-career teachers or students with a bachelor degree in an area that does not directly relate to a school subject); and 3) enhancing the image of the teacher profession in the academic world (KNAW, 2017). Increasing, or at least maintaining, the number of university-educated teachers in the upper grades of pre-university education may be one of the most important steps in the quest for more university-ready students, because how can teachers prepare their students for something they have not experienced themselves?

8.6 Concluding thoughts

The highest level of secondary education in the Netherlands is literally called preparatory university education, but does it actually prepare students sufficiently for university? Many first-year university students struggle with the transition to the new learning environment that demands students to be independent, where the learning content is more complex, and the learning pace is faster. From this thesis, 1) we know the skills and attitudes that are needed for students to be successful in university; 2) we know that a typology of secondary school students can be made that shows which students are more and who are less at risk of a difficult transition

to university; and 3) we know secondary school teachers' beliefs and practices regarding university preparation.

8.6.1 What does university readiness entail?

In order to adjust effectively to university, students need to be curious, to put in effort in their learning, and to be able to regulate their own learning process. In secondary school, different types of students based on these characteristics can already be identified. Some students score high overall – these students are the most successful in university – and some score low overall – these are the least successful. In addition, there is a group of students who are curious but do not work very hard – mostly boys doing science coursework. On the other hand, there is also a group of hard-working students who score lower on curiosity – mostly girls doing humanities/social sciences coursework. To get more ready for university, these boys should learn to work harder, and these girls should gain curiosity.

8.6.2 How can secondary school teachers help students to get ready?

Most secondary school teachers believe it is part of their job to prepare students for university, but a lack of time due to preparation for the final examinations and not knowing what universities expect from first-year students make this difficult for them. Therefore, in order to prepare students better for university, first, there should be more awareness in secondary schools that meeting the requirements of the final examinations does not guarantee university readiness, because graduating from secondary school does not imply that a student has the curious attitude, the willingness to work hard, and the capability of self-regulation that are needed in university. Once university preparation is recognised as a more explicit and prominent goal, communication between schools and universities is important, as is a critical look at the final examinations and whether they clash with or contribute to making students ready for university.

Then, students' curiosity and interest in gaining academic knowledge can be increased by bringing the academic world to the classroom, for example by discussing current research that appeals to students due to a connections with their own lives and experiences. For students who are taking humanities and social sciences coursework, it is also important that the richness and academic value of the humanities and social sciences is shown, for example by discussing important knowledge in fields that students do not encounter in school subjects, e.g., from fields like psychology or law.

Some students simply do not use or need to use learning strategies in secondary school. It is doubtful if they can also survive university without these skills, so it is important that these are explicitly taught and modelled. Over time, instruction and modelling can be faded away, so that the regulation of the learning process shifts from teacher to student, and it turns into self-regulation.

Both curiosity and self-regulation can be further improved by inquiry-based learning assignments where students can choose a topic that interests them and are forced to use self-regulation skills by going through a process of authentic inquiry by themselves, with the teacher in a facilitating and coaching role. The research project in the final year of secondary school can be seen as such an inquiry-based learning assignment and should be utilised as a project that mirrors a university research project and that aims to evaluate to what extent students are ready for university.

8.6.3 Final remarks

These suggestions all sound easier said than done and it seems like we dismiss the daily school practice where many students just do not want to exert any effort at all in school-related things, regardless how hard teachers try to make their lessons and assignments interesting. Many of these students will fall into the category of students who score low on curiosity, effort, and learning strategy use or into the category of students with very low curiosity. Not surprisingly, these students are likely to adapt least well to university and perform the worst. Consequently, these students are – at least in their current behaviour – at risk of a difficult transition to university and should be advised to consider a professional education degree (if they do not already consider this) or be made aware what is needed to be a successful university student.

Last, as a general point of attention, the measures currently set into motion by the government to increase the number of university-educated teachers are very important for university preparation in secondary school: Having graduated from university themselves will put teachers in a better position to prepare students for the university environment. Furthermore, a reboost, or at least a critical examination of, the economics and society and culture and society tracks in secondary education is needed, to get rid of their inferior image of only being an attractive option for students who (think they) are not good enough for science coursework and instead make them more rigorous and make them connect more with the academic fields of the humanities and social sciences. In that way also these tracks can do what they are meant to do, namely prepare students for humanities and social sciences university degrees.

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*These references are included in the systematic review (Chapter 3).

APPENDICES

Samenvatting

1 Introductie

Ieder jaar starten bijna 50.000 studenten in het eerste jaar van een universitaire opleiding (VSNU, 2017a). Het overgrote deel van deze groep betreft studenten die rechtstreeks van het vwo komen. Het vwo-diploma biedt hen toegang tot de universiteit, maar de vraag is of dit ook betekent dat ze 'klaar' zijn voor de universiteit; oftewel of ze over de benodigde eigenschappen beschikken om succesvol te zijn in het eerste jaar. De uitvalcijfers doen vermoeden dat dit voor een aanzienlijk deel van de studenten niet het geval is: 33 procent van alle eerstejaarsstudenten van het studiejaar 2014/2015 stroomde niet door naar het tweede jaar van de bacheloropleiding die ze gestart waren. Zeven procent verliet de universiteit en 26 procent veranderde van bachelor (Onderwijsinspectie, 2017). Het aantal studenten dat moeite heeft met de transitie van vwo naar universiteit is vermoedelijk nog hoger, aangezien niet iedereen die het zwaar heeft ook uitvalt of van opleiding verandert. Internationaal onderzoek geeft aan dat een kwart tot een derde van de eerstejaars aanzienlijke transitieproblemen ervaart (Lowe & Cook, 2003) en dat ten minste de helft van de studenten lagere cijfers haalt op de universiteit dan dat ze deden op het voortgezet onderwijs (Wintre et al., 2011). Transitieproblemen kunnen niet alleen leiden tot de genoemde academische problemen zoals uitval en onderpresteren, maar ook tot psychologische problemen zoals depressie (Leung, 2017; Lowe & Cook, 2002). Uitval en switchgedrag hebben bovendien negatieve consequenties voor universiteiten qua kosten en rendementen.

Diverse oorzaken spelen een rol bij het ontstaan van transitieproblemen, waarvan we twee belangrijke hier expliciet noemen. Ten eerste weten veel studenten niet goed wat ze moeten verwachten van studeren aan de universiteit of zijn de verwachtingen die ze hebben onrealistisch (Heublein et al., 2017; Smith & Wertlieb, 2005). Dit geldt in het bijzonder voor eerstegeneratiestudenten (studenten die de eerste in hun gezin zijn die naar de universiteit gaan). Hieraan gerelateerd hebben veel studenten vaak een onjuist beeld van de opleiding waar ze aan beginnen (De Buck, 2009). Onrealistische verwachtingen maken de kans groot op teleurstelling en ontevredenheid, wat vervolgens de kans vergroot op uitval en switchen. Een tweede oorzaak voor transitieproblemen is te herleiden tot het grote verschil tussen de leeromgeving op het vwo en die op de universiteit. Waar

op het vwo nog veel externe regulatie van het leerproces is (bijv. de leraar die het huiswerk van les tot les opgeeft en de stof tussentijds toetst d.m.v. overhoringen), doet de universiteit een groot beroep op het zelfregulerende vermogen van de student (bijv. tentamens zonder tussentijdse toetsen en het bijhouden van de stof is eigen verantwoordelijkheid). Bovendien gaat dit gepaard met een substantiële toename in de hoeveelheid en complexiteit van de leerstof. Onderzoek over studiesucces in het eerste jaar bevestigt dat veel studenten moeite hebben met tijdmanagement en zelfregulatie, vooral in het eerste semester (o.a. Haggis, 2006; Van der Meer, Jansen, & Torenbeek, 2010).

Het bevorderen van de rendementen in het eerste jaar van het hoger onderwijs staat gelukkig hoog op de agenda van zowel de overheid als de universiteiten en krijgt zodoende veel aandacht. Diverse maatregelen zijn genomen, zoals de invoering van het bindend studieadvies (BSA), het verplichten van matchingsprocedures voorafgaand aan de start van een programma (de zogenoemde studiekeuzecheck) en de toename van kleinschalig onderwijs in het eerste jaar, zoals leergemeenschappen. Ook in de onderzoekswereld krijgt het eerste jaar in het hoger onderwijs veel aandacht, vaak onder de noemer 'first-year experience'. De fase voorafgaand aan het hoger onderwijs staat echter niet bepaald in de spotlights als het gaat om succes in de vervolgopleiding. Daarom focust dit proefschrift op de transitie van vwo naar universiteit met de nadruk op *university readiness*[1] van vwo-leerlingen en de universiteitsvoorbereidende rol van het vwo.

2 Doel en onderzoeksvragen

Het overkoepelende doel van dit proefschrift is om meer inzicht te verkrijgen in de transitie van vwo naar universiteit, om zo aanknopingspunten te kunnen bieden om de transitie te verbeteren en uitval en switchgedrag in het eerste jaar op de universiteit te verminderen en studiesucces te verhogen. Twee onderzoeksvragen staan centraal:

1. Welke studentkenmerken dragen bij aan het ervaren van een vlotte transitie van vwo naar universiteit en aan eerstejaars studiesucces?
2. Welke rol spelen vwo-leraren in het voorbereiden van leerlingen op de universiteit?

1 Omdat enkele Engelstalige termen lastig te vertalen zijn naar het Nederlands op een dusdanige manier dat ze de betekenis van het oorspronkelijke begrip dekken, zijn deze onvertaald gelaten. Deze termen zijn cursief weergegeven.

3 Theoretisch kader

Het overkoepelende theoretisch kader van dit proefschrift wordt gevormd door vier theorieën.

3.1 Schlossbergs transitietheorie

Schlossberg (2008) definieert een transitie als een gebeurtenis die leidt tot veranderingen in relaties, routines, assumpties en rollen, waarbij degene die de transitie ondergaat zich moet aanpassen aan deze veranderingen. Vier aspecten beïnvloeden het aanpassingsproces, namelijk de situatie, de beschikbare ondersteuning, persoonlijke eigenschappen, en de strategieën die iemand benut om om te gaan met de transitie. In dit proefschrift spelen persoonlijke eigenschappen (bijv. motivatie) in alle studies een rol. De strategieën om om te gaan met de transitie spelen in Hoofdstuk 5 en Hoofdstuk 7 een vooraanstaande rol in de vorm van het construct academische aanpassing.

3.2 Conleys model van *college readiness*

Conley (2008) definieert *college readiness* als de mate waarin de persoonlijke en onderwijservaringen van een leerling hem of haar hebben toegerust voor de verwachtingen en eisen die de vervolgopleiding in het hoger onderwijs aan hem of haar stelt. Die toerusting bestaat volgens Conley uit vier sleutelfactoren: cognitieve strategieën (de manier van denken en werken die verlangd wordt in het hoger onderwijs, bijv. kritisch denken en onderzoeksvaardigheden); inhoudelijke basiskennis (kennis en vaardigheden in de kernvakken, zoals schrijfvaardigheden); studievaardigheden en -technieken (academisch gedrag en psychologische eigenschappen die nodig zijn voor succes, zoals zelfregulatie en zelfeffectiviteit); en transitiekennis en -vaardigheden (kennis en vaardigheden nodig om een opleiding te kiezen en je vervolgens succesvol te navigeren binnen de hogeronderwijsomgeving, zoals inzicht in het opleidingsaanbod en in financiële kwesties, bijv. weten hoe het zit met het studievoorschot). Beschikt een leerling in voldoende mate over deze vier elementen, dan is de kans groot dat hij of zij klaar is voor het hoger onderwijs. Drie van Conleys sleutelfactoren komen regelmatig terug in het gehele proefschrift: cognitieve strategieën, studievaardigheden en -technieken, en transitiekennis en -vaardigheden. Tevens wordt het gehele model als theoretisch kader gebruikt in Hoofdstuk 6.

3.3 Astins theorie van *student involvement*

Astins theorie (1999) is gebaseerd op een input-throughput-output model, waarbij de input bestaat uit de achtergrond en eerdere (onderwijs)ervaringen van een leerling, de throughput uit hoe de student omgaat met de nieuwe leeromgeving in het hoger onderwijs, en de output uit studentkenmerken nadat het hogeronderwijsdiploma is behaald. De throughput staat centraal in Astins model; het gaat dan voornamelijk om de betrokkenheid van de student. De betrokkenheid bepaalt hoe succesvol een student is. De laatste jaren is er stevig voortgeborduurd op Astins theorie van *involvement* in de vorm van onderzoek naar *student engagement*, een vergelijkbaar construct (o.a. Kuh, 2009; Pike & Kuh, 2005). *Engagement* komt in diverse studies in dit proefschrift terug; in het Nederlands refereren we dan aan betrokkenheid.

3.4 Tinto's theorie van *student attrition*

In Tinto's theorie (1975) wordt uitval gerelateerd aan de mate van academische en sociale integratie van een student, die op hun beurt invloed uitoefenen op iemands toewijding aan de opleiding en diens persoonlijke doelen, die vervolgens bepalen of iemand al dan niet met de opleiding stopt. Studentkenmerken en instellingskenmerken spelen ook een rol in Tinto's model. De focus op integratie maakt Tinto's theorie een geschikt uitgangspunt voor transitieonderzoek. In dit proefschrift wordt veel aandacht besteed aan academische aanpassing, een concept dat inhoudelijk zeer sterk overlapt met Tinto's notie van academische integratie.

4 Resultaten

Hieronder worden de vijf studies van dit proefschrift afzonderlijk besproken.

4.1 Voorspellers van studiesucces in het eerste jaar van het hoger onderwijs

Een nuttig startpunt voor onderzoek naar de transitie van voortgezet onderwijs naar hoger onderwijs is een overzicht van factoren die studiesucces in het eerste jaar beïnvloeden. Een dergelijk overzicht was niet voorhanden wat betreft studiesucces in het Nederlandstalige hoger onderwijs. Het Vlaamse onderwijssysteem is in veel aspecten vergelijkbaar met het Nederlandse, waardoor we samen met Vlaamse collega's een systematische overzichtsstudie hebben uitgevoerd naar factoren die studiesucces beïnvloeden in het eerste jaar van het hoger onderwijs in de

lage landen. Als studiesucces hebben we naar drie uitkomstmaten gekeken: het gemiddelde cijfer, het aantal behaalde studiepunten, en retentie (doorgaan naar het tweede jaar). Het onderzoek betrof het gehele hoger onderwijs, dus zowel hogescholen (hbo) als universiteiten (wo). Onze onderzoeksvragen luidden als volgt:

1. Welke factoren beïnvloeden het studiesucces van eerstejaarsstudenten in het Nederlandse en Vlaamse hoger onderwijs?
2. Zijn er verschillen in studiesuccesvoorspellers tussen Nederland en Vlaanderen, tussen hbo en wo, en naar gelang de uitkomstmaat die gehanteerd wordt (gemiddeld cijfer, studiepunten, en retentie)?

In totaal voldeden 38 peer-reviewed artikelen, gepubliceerd tussen 2000 en 2015, aan onze inclusiecriteria. Deze zijn dus meegenomen in de overzichtsstudie. In de analyse hebben we de factoren die samenhangen met studiesucces ingedeeld in een negental categorieën: 1) intellectuele capaciteitsfactoren; 2) demografische factoren; 3) kenmerken van de vooropleiding; 4) persoonlijkheid; 5) motivatie; 6) kenmerken van de leeromgeving; 7) psychosociale kenmerken; 8) leerstrategiegebruik; en 9) betrokkenheid. Een aantal factoren binnen deze categorieën hing consistent samen met alle drie de uitkomstmaten, namelijk het gemiddelde cijfer op het voortgezet onderwijs (vo), het vakkenpakket op het vo, consciëntieusheid, intrinsieke motivatie, academische aanpassing, gebrek aan regulatie, aanwezigheid bij colleges, en geobserveerde leeractiviteiten. Consistente relaties met het gemiddelde cijfer en het aantal studiepunten, maar niet met retentie, zijn gevonden voor zelfeffectiviteit, faalangst, verwachtingen, en het aantal contacturen. Als we kijken naar de categorieën van factoren, dan valt op dat capaciteitsfactoren (bijv. het gemiddelde vo-cijfer), kenmerken van de vooropleiding, kenmerken van de leeromgeving, en betrokkenheid het meest succesvol waren in het verklaren van studiesucces. Dit wil zeggen dat factoren binnen deze categorieën het vaakst significante relaties lieten zien met de uitkomstmaten. Hoeveel significante verbanden met studiesucces er werden gevonden binnen een categorie verschilde voor de meeste categorieën per uitkomstmaat. Capaciteitsfactoren waren bijvoorbeeld het vaakst verbonden met studiesucces als gemiddeld cijfer en studiepunten de uitkomstmaten waren. Hetzelfde gold voor persoonlijkheidsfactoren. Motivatie speelde vooral een rol bij het verklaren van het gemiddelde cijfer, net als leerstrategieën – hoewel leerstrategieën in het algemeen relatief weinig samenhang vertoonden met studiesucces. Demografische factoren waren met name voornaam als de

uitkomstmaat uit studiepunten bestond, en psychosociale factoren hingen vaker samen met studiepunten en retentie dan met het gemiddeld cijfer.

Door het lage aantal Vlaamse studies konden geen sterke conclusies worden getrokken wat betreft verschillen tussen studiesuccesvoorspellers in Nederland en Vlaanderen, maar er is een voorzichtige indicatie dat demografische factoren en vooropleiding een grotere rol spelen in Vlaanderen dan in Nederland. Dit zou te maken kunnen hebben met het open onderwijssysteem in het Vlaamse hoger onderwijs, waar eenieder met een opleiding kan beginnen. Wat betreft verschillen tussen hbo en wo, zagen we dat op het hbo de vrouwen duidelijk beter presteerden, terwijl een dergelijke genderkloof op het wo afwezig was. Daarentegen speelden het niveau van de vooropleiding, persoonlijkheidsfactoren, en leerstrategiegebruik een grotere rol in het verklaren van studiesucces in het wo dan in het hbo.

Specifiek relevant voor het thema van dit proefschrift was dat slechts weinig Nederlandse en Vlaamse onderzoeken variabelen omtrent het voortgezet onderwijs meenamen in aanvulling op het gemiddelde cijfer op het vo. De studies die dit wel deden, lieten zien dat studenten die op het vo meer bètavakken, wiskunde, en klassieke talen in hun vakkenpakket hadden het beter deden op de universiteit: Ze behaalden een hoger gemiddeld cijfer, meer studiepunten, en gingen vaker door naar het tweede jaar. Bovendien liet Nederlands onderzoek zien dat studenten die een positievere perceptie hadden van de *fit* tussen het vwo en de universiteit meer studiepunten behaalden. De uitvoering van het studiekeuzeproces in de laatste jaren van het voortgezet onderwijs had echter geen direct effect op studiesucces in het hoger onderwijs.

Samengevat liet deze overzichtsstudie zien voor welke factoren er consistent bewijs is dat ze een impact hebben op studiesucces in het hoger onderwijs. De factoren hiervan die studentkenmerken betreffen kunnen daardoor gezien worden als aspecten van *university readiness*, waarvan het belangrijk is dat ze gepromoot worden op het vwo.

4.2 Factoren die samenhangen met het vertrouwen van vwo'ers dat ze een succesvolle universitaire student zullen zijn

Omdat zelfeffectiviteit bekend staat als één van de belangrijkste voorspellers van studiesucces én omdat het gerelateerd is aan het effectief kunnen omgaan met uitdagende situaties zoals transities, is de kans groot dat leerlingen die aan het einde van het vwo hoog scoren op zelfeffectiviteit een vlottere transitie ervaren naar de universiteit. In dit onderzoek focusten we daarom specifiek op factoren

die invloed uitoefenen op de zelfeffectiviteit van vwo'ers. In dit onderzoek is zelfeffectiviteit gedefinieerd als de mate van vertrouwen dat een vwo'er erin heeft dat hij of zij in staat is om de diverse gedragingen die nodig zijn voor het studeren aan een universiteit succesvol uit te voeren. Het onderzoek werd geleid door de volgende onderzoeksvragen:

1. Wat is de invloed van *need for cognition*, wetenschappelijke interesse, gedragsmatige betrokkenheid, en buitenschoolse wetenschappelijke activiteiten op zelfeffectiviteit in succesvol zijn op de universiteit?
2. Hoeveel invloed wordt er uitgeoefend door de achtergrondvariabelen sekse, opleidingsniveau van de ouders, en het profiel dat een leerling volgt?

Padanalyse met data die is verzameld bij 4- en 5-vwo-leerlingen liet zien dat *need for cognition*, wetenschappelijke interesse en buitenschoolse wetenschappelijke activiteiten gerelateerd waren aan zelfeffectiviteit. *Need for cognition* en wetenschappelijke interesse hadden de grootste impact. Daarnaast bleek dat *need for cognition* ook indirect gerelateerd was aan zelfeffectiviteit, dankzij de invloed die het uitoefende op wetenschappelijke interesse en buitenschoolse wetenschappelijke activiteiten. Gedragsmatige betrokkenheid bij school hing niet samen met zelfeffectiviteit. Sekse had invloed op buitenschoolse wetenschappelijke activiteiten, die vaker werden uitgeoefend door jongens, en gedragsmatige betrokkenheid, wat bij meisjes hoger was. Leerlingen met universitair opgeleide ouders hadden een hogere *need for cognition* en deden meer buitenschoolse wetenschappelijke activiteiten. Tot slot had het profiel invloed: Leerlingen met een natuurprofiel hadden een hogere *need for cognition* en meer wetenschappelijke interesse.

Dit onderzoek gaf aan dat *need for cognition* een cruciaal construct is in het bepalen van hoeveel vertrouwen een vwo'er erin heeft dat hij of zij over de vaardigheden beschikt die nodig zijn op de universiteit. Kijkende naar het gehele model, dan werd duidelijk dat persoonlijkheid (in de vorm van *need for cognition*) en motivatie (in de vorm van wetenschappelijke interesse) belangrijker waren voor zelfeffectiviteit dan daadwerkelijk gedrag (in de vorm van gedragsmatige betrokkenheid). Verder wees dit onderzoek erop dat achtergrondvariabelen in het oog gehouden moeten worden, omdat deze ertoe kunnen leiden dat bepaalde leerlingen – in het bijzonder meisjes met een maatschappijprofiel zonder universitair opgeleide ouders – systematisch lager scoren op *need for cognition* en wetenschappelijke interesse en nauwelijks betrokken zijn bij buitenschoolse

wetenschappelijke activiteiten. Als gevolg daarvan is voor deze leerlingen de kans groter dat ze een lage zelfeffectiviteit hebben, d.i. weinig vertrouwen in hun succes op de universiteit, waardoor de transitie naar de universiteit voor hen extra lastig kan zijn.

4.3 De samenhang tussen leerlingbetrokkenheid op het vwo en succes op de universiteit

Uit de overzichtsstudie (Hoofdstuk 3) werd duidelijk dat niet veel onderzoek kenmerken van vo-leerlingen koppelt aan hoe ze later presteren in het hoger onderwijs. Leerling- respectievelijk studentbetrokkenheid is een belangrijke voorspeller van leerresultaten in het voortgezet en hoger onderwijs. Academische aanpassing is een belangrijke voorspeller voor studiesucces op de universiteit en tevens een goede graadmeter voor hoe vlot iemand de transitie van vwo naar universiteit heeft doorlopen. In dit onderzoek hebben we verschillende leerlingprofielen onder 6-vwo-leerlingen geïdentificeerd, gebaseerd op drie soorten betrokkenheid: gedragsmatige, cognitieve, en intellectuele betrokkenheid. Vervolgens hebben we onderzocht of en hoe deze leerlingprofielen samenhingen met academische aanpassing en studiesucces op de universiteit een jaar later. Dit waren de onderzoeksvragen:

1. Welke leerlingprofielen kunnen worden onderscheiden in 6-vwo-leerlingen op basis van gedragsmatige, cognitieve en intellectuele betrokkenheid?
2. Is er samenhang tussen 6-vwo-leerlingprofiel en academische aanpassing en studiesucces een jaar later op de universiteit?

Met behulp van latente profielanalyse konden vijf profielen worden geïdentificeerd: intellectueel zeer onbetrokken (7%); gedragsmatig en cognitief onbetrokken (14%); gemiddeld betrokken (36%); intellectueel betrokken (22%); en zeer betrokken leerlingen (21%). Jongens waren oververtegenwoordigd in het gedragsmatig en cognitief onbetrokken profiel en in het intellectueel betrokken profiel, m.a.w. in de groepen waarin de intellectuele betrokkenheid (*need for cognition*, wetenschappelijke interesse en zelfeffectiviteit in het kunnen begrijpen van wetenschappelijke leerstof) hoger waren dan de gedragsmatige betrokkenheid (gedragsmatige betrokkenheid en zelfeffectiviteit in het zich voldoende inzetten om effectief te studeren) en cognitieve betrokkenheid (het gebruik van cognitieve en metacognitieve strategieën zoals zelfregulatie). Leerlingen met een natuurprofiel waren oververtegenwoordigd in de groep van de intellectueel

betrokken leerlingen; leerlingen met een maatschappijprofiel daarentegen waren vaker te vinden in de groep van intellectueel zeer onbetrokken leerlingen.

Uit de dataverzameling onder dezelfde leerlingen een jaar later, in het eerste semester op de universiteit, bleek dat de zeer betrokken leerlingen het meest succesvol waren: Ze behaalden het hoogste gemiddelde cijfer, de meeste studiepunten en scoorden het beste op alle vier de aspecten van academische aanpassing (motivatie, toepassing, prestatie en omgeving). Intellectueel zeer onbetrokken leerlingen behaalden het laagste gemiddelde cijfer, de minste studiepunten en hadden de meeste moeite met het academische aanpassingsaspect prestatie (academische inspanningen leveren die doeltreffend zijn). Gedragsmatig en cognitief onbetrokken leerlingen scoorden het laagste op de gehele academische aanpassingsschaal en op alle afzonderlijke aspecten m.u.v. prestatie. De gemiddeld betrokken en intellectueel betrokken groepen leerlingen deden het beide redelijk op de universiteit, hoewel er enkele kleine verschillen te zien waren tussen deze groepen: De gemiddeld betrokken leerlingen scoorden hoger dan de intellectueel betrokken leerlingen op de aanpassingsaspecten toepassing (jezelf toeleggen op je studietaken) en prestatie, terwijl de intellectueel betrokken leerlingen hogere scores hadden op motivatie (motivatie om op academisch niveau bezig te zijn) en omgeving (tevredenheid met de universitaire leeromgeving). Deze verschillen wijzen op het bestaan van diverse types betrokkenheid, maar ook op een zekere stabiliteit binnen leerlingen wat betreft het soort betrokkenheid waar ze hoger of lager op scoren: De leerlingen die op het vwo nieuwsgierig en wetenschappelijk geïnteresseerd waren en veel vertrouwen hadden in hun intellectuele capaciteiten waren een jaar later vlot aangepast aan de universiteit in de zin van het gemotiveerd zijn om academisch bezig te gaan en het content zijn in de academische leeromgeving; de leerlingen die vooral hard werkten op het vwo en met name vertrouwen hadden in hun inzet en niet zozeer in hun intellectuele capaciteiten pasten zich vooral vlot aan aan de universiteit wat betreft het leveren van voldoende inzet en het zich toewijden aan het studeren.

Dit onderzoek liet zien dat het waardevol is om diverse types van betrokkenheid te onderscheiden in vwo-leerlingen en dat deze types samenhangen met academische aanpassing en studiesucces op de universiteit.

4.4 De opvattingen en praktijken van vwo-leraren wat betreft universiteitsvoorbereiding

Vwo-leraren kunnen een belangrijke rol spelen in het voorbereiden van leerlingen op de universiteit, maar er is vooralsnog weinig bekend over hun rol hierin. In deze studie waren we geïnteresseerd in de opvattingen van leraren wat betreft kenmerken van *university readiness*, hun rolperceptie m.b.t. universiteitsvoorbereiding, en wat ze concreet deden in de klas om leerlingen voor te bereiden. De vier onderzoeksvragen luidden:

1. Wat vinden leraren belangrijke kenmerken van *university readiness* (m.a.w. over welke eigenschappen denken ze dat beginnende studenten moeten beschikken)?
2. Zijn leraren expliciet of impliciet bezig met universiteitsvoorbereiding in hun lessen, en zo ja, op welke manier?
3. Wat is de rolperceptie van leraren ten aanzien van universiteitsvoorbereiding?
4. Ervaren leraren barrières die hen belemmeren om leerlingen voor te bereiden op de universiteit, en zo ja, wat zijn deze barrières en hoe kunnen deze worden verminderd?

Semigestructureerde interviews zijn gehouden met 50 leraren die lesgaven in de bovenbouw van het vwo. Op deze data is frameworkanalyse toegepast, waarbij het framework bestond uit het model van *college readiness* van Conley, dat bestaat uit cognitieve strategieën, basiskennis, leerstrategieën en -technieken, en transitiekennis en -vaardigheden.

Als belangrijkste kenmerken van *university readiness* noemden leraren voornamelijk aspecten die behoorden tot de categorie leerstrategieën en -technieken. Dit correspondeerde echter niet met waar ze de meeste aandacht aan besteedden in de les in het kader van universiteitsvoorbereiding, want dat betrof vooral transitiekennis en -vaardigheden. Overdracht hiervan bestond uit het verschaffen van informatie over studeren aan de universiteit, meestal op initiatief van de leerlingen, dus het beantwoorden van vragen. Hoewel de meerderheid van de leraren universiteitsvoorbereiding als een belangrijk deel van hun taak zag, was men hierover niet unaniem. Een aanzienlijk aantal leraren was van mening dat het voorbereiden van de leerlingen op de centrale examens aan het einde van leerjaar 6 gelijkstond aan universiteitsvoorbereiding, corresponderend met de opvatting dat het behalen van een vwo-diploma betekent dat iemand klaar is voor de universiteit. Daarnaast bleek dat universiteitsvoorbereiding zelden een

expliciet doel was: Als leraren handelingen beschreven die volgens hen bijdroegen aan *university readiness* (bijv. het geven van meer vrijheid aan hun leerlingen of de leerlingen onderzoeksopdrachten laten uitvoeren), gaven ze regelmatig toe dat ze deze handelingen niet bewust deden met het doel van universiteitsvoorbereiding in hun achterhoofd. Factoren die bijdroegen aan expliciete aandacht voor universiteitsvoorbereiding waren de eigen ervaringen van een leraar op de universiteit (bijv. zelf de transitie als lastig hebben ervaren) en/of het hebben van kinderen die een universitaire opleiding volgen. De meest genoemde belemmeringen om meer aandacht te besteden aan universiteitsvoorbereiding waren de centrale examens, die veel voorbereidingstijd kostten en het curriculum bepaalden, en het gebrek aan een duidelijk beeld van wat universiteiten verwachten van eerstejaarsstudenten.

Dit onderzoek gaf aan dat er behoefte is aan meer bewustzijn in het vwo voor expliciete universiteitsvoorbereiding en aan samenwerking tussen scholen en universiteiten, ten minste in de vorm van communicatie over wederzijdse verwachtingen.

4.5 Academische aanpassing als cruciaal proces in de transitie naar de universiteit

Academische aanpassing, d.w.z. het hebben van succesvolle interacties met de nieuwe academische omgeving en het kunnen omgaan met de nieuwe academische eisen, kan worden gezien als een graadmeter voor hoe vlot iemand de transitie van vwo naar universiteit doorloopt. De overzichtsstudie (Hoofdstuk 3) bevestigde het belang van academische aanpassing als voorspeller van studiesucces in het eerste jaar. In dit onderzoek wilden we meer inzicht verkrijgen in welke motivationele en gedragsmatige factoren academische aanpassing beïnvloeden en hoe groot de invloed is van zowel academische aanpassing als van deze factoren op studiesucces (gemiddeld cijfer, aantal behaalde studiepunten, en intentie om door te gaan naar het tweede jaar van de opleiding). Drie onderzoeksvragen stonden centraal:

1. Welke motivationele en gedragsmatige factoren gemeten in het eerste jaar op de universiteit beïnvloeden academische aanpassing en studiesucces?
2. Beïnvloeden deze factoren studiesucces direct of indirect via academische aanpassing?
3. Hoe groot is de invloed van academische aanpassing op de drie maten van studiesucces?

Een padanalyse met data van eerstejaarsstudenten van diverse opleidingen liet zien dat academische aanpassing werd beïnvloed door – op volgorde van grootte van invloed – zelfregulatie, tevredenheid met de opleiding, en wetenschappelijke interesse. Academische zelfeffectiviteit had geen invloed op academische aanpassing, maar hing wel sterk samen met zelfregulatie. Academische aanpassing had een relatie met zowel het gemiddelde cijfer als het aantal behaalde studiepunten; het effect van academische aanpassing op het gemiddelde cijfer in het eerste jaar op de universiteit was zelfs sterker dan het effect van het gemiddelde cijfer behaald op het vwo. Geen van de motivationele en gedragsmatige factoren hing direct samen met het gemiddelde cijfer of met het aantal behaalde studiepunten; ze beïnvloedden deze uitkomstmaten alleen via academische aanpassing. Tevredenheid met de opleiding was de enige factor die samenhing met de intentie om door te gaan naar het tweede jaar van de opleiding – academische aanpassing en intentie om door te gaan hingen niet met elkaar samen.

Deze studie bevestigde het belang van academische aanpassing in het voorspellen van het gemiddelde cijfer en het aantal behaalde studiepunten in het eerste semester van het eerste jaar op de universiteit, maar gaf ook aan dat aanpassing geen invloed had op de intentie om te blijven. Daarnaast werd duidelijk dat studenten die beter waren in het reguleren van hun eigen studiegedrag, die tevredener waren met hun opleiding, en die meer wetenschappelijke interesse hadden zich vlotter aanpasten aan de universitaire leeromgeving en zodoende waarschijnlijk een betere transitie van vwo naar universiteit ervoeren.

5 Conclusie en discussie

In deze paragraaf beantwoorden we de twee hoofdvragen van het onderzoek, doen we suggesties om de universiteitsvoorbereiding op het vwo te verbeteren, geven we de beperkingen van het onderzoek aan, en formuleren we aanbevelingen voor vervolgonderzoek.

5.1 Welke studentkenmerken dragen bij aan een vlotte transitie van vwo naar universiteit en aan studiesucces in het eerste jaar?

Bij het bekijken van het algehele beeld dat uit de vijf onderzoeken naar voren komt, wordt duidelijk dat veel factoren een rol spelen bij de transitie, maar dat de rol van

de factoren afhankelijk is van de uitkomstmaat (gemiddeld cijfer, studiepunten, of retentie) en de fase waarin de leerling of student zich bevindt (in het vwo of op de universiteit). Dit maakt het een complex beeld. Hoofdstukken 4 en 5 lieten zien dat *need for cognition* en wetenschappelijke interesse samenhingen met het vertrouwen in het succesvol zijn op de universiteit vóór de transitie en met meer motivatie om een academische studie te doen en het zich meer thuisvoelen op de universiteit na de transitie. Hoofdstuk 5 wees uit dat vwo'ers met meer gedragsmatige en cognitieve betrokkenheid het later beter deden op de universiteit dan leerlingen met een lagere gedragsmatige en cognitieve betrokkenheid. Bovendien zagen we dat leerlingen die op alle types van betrokkenheid hoog scoorden – gedragsmatig, cognitief en intellectueel – het zelfs beter deden dan leerlingen die de topscores hadden op intellectuele betrokkenheid. Dit komt overeen met de bevindingen van de overzichtsstudie over studiesuccesvoorspellers (Hoofdstuk 3), waarin duidelijk werd dat diverse indicatoren van betrokkenheid in het hoger onderwijs (zoals aanwezigheid bij colleges, tijd besteed aan zelfstudie, en het maken van opdrachten) invloed hadden op het gemiddelde cijfer, de behaalde studiepunten, en retentie. Het lijkt er dus op dat factoren als nieuwsgierigheid, wetenschappelijke interesse, en een vertrouwen in de eigen intellectuele capaciteiten belangrijk zijn, omdat deze leerlingen motiveren om naar de universiteit te gaan en er vervolgens voor zorgen dat ze zich op hun plek voelen op de universiteit, maar dat factoren met betrekking tot daadwerkelijk studiegedrag – gedragsmatige en cognitieve betrokkenheid – vervolgens noodzakelijk zijn in het voorspellen van studiesucces en algehele academische aanpassing op de universiteit. Van deze factoren is vooral zelfregulerend gedrag cruciaal.

Leerlingen scoren echter verschillend op al deze factoren, zoals we zagen in Hoofdstuk 5. Hoewel er leerlingen zijn die op alle facetten van betrokkenheid laag, gemiddeld of hoog scoren, is er een groep die hoog scoort op intellectuele betrokkenheid, maar laag op gedragsmatige en cognitieve betrokkenheid – vereenvoudigd gesteld de nieuwsgierige leerlingen die niet veel inzet tonen op school. Daarnaast is er een groep met het tegenovergestelde patroon: een groep die hard werkt op school, maar wat minder nieuwsgierig en wetenschappelijk geïnteresseerd is. Vanuit Hoofdstukken 4 en 5 kunnen we de volgende achtergrondkenmerken aan deze profielen verbinden: De nieuwsgierige, niet zo hardwerkende leerling is typisch mannelijk met een natuurprofiel; de hardwerkende, minder nieuwsgierige leerling vaker vrouwelijk met een maatschappijprofiel. Aangezien deze betrokkenheidspatronen al zichtbaar zijn op

het vwo en samenhangen met aanpassing en succes op de universiteit, zou het vwo kunnen bijdragen aan de *university readiness* van leerlingen door ervoor te zorgen dat er meer balans komt in iemands betrokkenheidsprofiel: De eerste groep zou kunnen worden uitgedaagd om zich meer in te zetten en om (te leren om) leerstrategieën toe te passen; de tweede groep zou erbij gebaat zijn als hun wetenschappelijke interesse meer wordt opgewekt. Voor de groep die relatief laag scoorde op alle betrokkenheidsaspecten is een opleving in beide nodig, mits deze leerlingen een universitaire opleiding overwegen.

4.2 Welke rol spelen vwo-leraren in het voorbereiden van leerlingen op de universiteit?

Aangezien deze vraag gelijk is aan de onderliggende vraag van het onderzoek in Hoofdstuk 4, kan in Paragraaf 4.4 van deze appendix het uitgebreide antwoord worden gelezen. Kort samengevat verschilt de rol van de vwo-leraar in universiteitsvoorbereiding sterk per leraar. Over het algemeen is de meest voorkomende universiteitsvoorbereidende handeling van leraren het geven van informatie aan leerlingen, zowel over studeren aan de universiteit in het algemeen als over specifieke opleidingen die in het verlengde van het schoolvak van de betreffende leraar liggen. Slechts een enkele leraar was bewust bezig met universiteitsvoorbereiding: Hoewel veel leraren het als een belangrijke taak van vwo-leraren zien, is het niet iets waar ze continu en/of expliciet mee bezig zijn. Daarnaast vormen de centrale examens en het niet weten wat universiteiten van eerstejaarsstudenten verwachten een barrière om meer aandacht aan universiteitsvoorbereiding te besteden.

4.3 Suggesties voor betere universiteitsvoorbereiding op het vwo

Uit dit proefschrift en eerdere literatuur kunnen verschillende aandachtspunten worden afgeleid die kunnen bijdragen aan een betere voorbereiding op de transitie van vwo naar universiteit.

Ten eerste is het belangrijk dat er in het vwo meer aandacht wordt besteed aan het bevorderen van de zelfregulatie van leerlingen, aangezien zelfregulatie een grote invloed heeft op aanpassing aan de universitaire leeromgeving. Zelfregulatie betekent dat leerlingen controle hebben over hun eigen leerproces en -omgeving door doelen te stellen, strategieën te selecteren, deze strategieën ook daadwerkelijk toe te passen, en vervolgens hun leerproces en leeruitkomst te monitoren en evalueren. Wat leraren in de bovenbouw vaak al doen, is het geven van meer

vrijheid aan leerlingen door bijvoorbeeld minder vaak huiswerk te controleren of leerlingen buiten het lokaal te laten werken. Hiermee creëren ze een leeromgeving die om zelfregulatie vraagt, maar dit betekent niet dat alle leerlingen dit ook (kunnen) toepassen. Het is daarom ook belangrijk dat leerlingen expliciet wordt aangeleerd hoe ze hun eigen leerproces kunnen reguleren door bijvoorbeeld dit gedrag te modelleren en de leerlingen concrete stappen aan te leren.

Daarnaast is het aan te raden om kritisch te kijken naar het maatschappijprofiel. De profielstructuur in havo en vwo heeft als doel om leerlingen voor te bereiden op een opleiding in het verlengde van het profiel dat een leerling kiest, maar dit lijkt momenteel niet het geval te zijn, aangezien leerlingen met een natuurprofiel ook beter presteren in opleidingen in de alfa- en gammagebieden. Dit kan een zelfselectie-effect zijn – dat de betere leerlingen een natuurprofiel kiezen – maar het kan ook zijn dat het natuurprofiel beter voorbereidt. Ongeacht de oorzaak zou het voor maatschappijleerlingen voordelen opleveren als er in de maatschappijvakken meer raakvlakken worden gezocht met de wetenschappelijke wereld, door bijvoorbeeld leerlingen een beeld te geven van wetenschappelijk onderzoek dat in deze gebieden wordt verricht en door leerlingen bekend te maken met alfa- en gamma-opleidingen die niet direct aan een schoolvak verwant zijn. Daarnaast kan worden gekeken of er in het maatschappijprofiel meer aandacht kan worden besteed aan onderzoeksmatig leren, omdat dit bijdraagt aan de zelfregulatie en aan andere belangrijke aspecten van *university readiness*, zoals kritisch en analytisch denken. Hieraan gerelateerd is het tevens belangrijk dat het profielwerkstuk serieus wordt aangepakt en wordt gezien als het onderzoeksmatig sluitstuk van de vwo-opleiding en bewijs van zelfstandig pre-wetenschappelijk denken van leerlingen. Verder zou het goed zijn om te kijken naar de inhoud van vakken die tot een bepaald profiel behoren, bijvoorbeeld naar de verschillende types wiskunde. Onderzoek toont aan dat wiskunde B een betere voorbereiding biedt op een economieopleiding dan wiskunde A – het type wiskunde dat standaard tot het profiel economie & maatschappij behoort – en dat studenten in sociale opleidingen vaak wiskundig tekortschieten, met name wat betreft statistiek.

Een derde aanbeveling is dat scholen en universiteiten meer samenwerken. Wat sowieso noodzakelijk is, is dat de universiteiten duidelijk maken wat ze verwachten van eerstejaarsstudenten, aangezien vwo-leraren als knelpunt aangaven dat ze niet weten wat een eerstejaarsstudent zou moeten weten en kunnen. Voor zover dit nog niet het geval is, zouden decanen vanuit het vwo een

hoofdrol kunnen spelen in de informatieuitwisseling met universiteiten (bijv. met coördinatoren van het eerste jaar of studieadviseurs), in het bijhouden van gegevens over hoe oud-leerlingen presteren in het hoger onderwijs, en in het houden van contact met oud-leerlingen zodat hun ervaringen met de transitie kunnen worden geëvalueerd. Tevens zou het wenselijk zijn als er per sectie een leraar is die up-to-date blijft over de ontwikkelingen op universiteiten in zijn of haar vakgebied en de collega's in de sectie hierover op de hoogte houdt. Naast samenwerking zou er meer afstemming kunnen plaatsvinden tussen scholen en universiteiten wat betreft de leeromgeving, zodat leerlingen alvast kunnen wennen aan en een beter beeld krijgen van universitair leren. Leraren kunnen hun reguliere lessen bijvoorbeeld afwisselen met een hoorcollege of leerlingen een opdracht geven op het niveau van het eerste jaar van de universiteit. Tot slot zou het goed zijn als huidige initiatieven van universiteiten wat betreft webclasses voor scholieren worden voortgezet en uitgebouwd. Deze webclasses zijn korte online cursussen op het niveau van het eerste jaar, geleid door een universitair docent. Ze geven leerlingen niet alleen een beeld van een specifieke opleiding en helpen op die manier bij de studiekeuze, maar laten leerlingen ook ervaren hoe het is om aan de universiteit te studeren. Hierdoor dragen ze bij aan het kweken van realistische verwachtingen. Bovendien kunnen dergelijke webclasses behulpzaam zijn voor leerlingen die twijfelen tussen hbo en wo door leerlingen inzicht te geven in of het wo iets voor hen is.

Een laatste aanbeveling betreft het vwo-lerarenkorps. Momenteel hebben de meeste leraren in het vwo een eerstegraads bevoegdheid die behaald is aan de universiteit, maar een aanzienlijk deel van deze leraren nadert de pensioengerechtigde leeftijd en de instroom in de universitaire lerarenopleidingen neemt af. Voor leraren met een tweedegraads bevoegdheid en leraren met een via een hbo-master behaalde eerstegraads bevoegdheid, die zelf dus niet een universitaire bachelor en master in hun vakgebied hebben behaald, is het lastiger om leerlingen voor te bereiden op de universiteit. Ten eerste zijn veel van de kenmerken van *university readiness* typisch dingen die een leraar kan overbrengen op zijn of haar leerlingen door ze voor te leven, te modelleren. Te denken valt aan onder andere de nieuwsgierige houding, de onderzoeksmatige manier van denken en redeneren, en kritisch denken. Leraren die zelf minstens vijf jaar (drie jaar bachelor en twee jaar master) hebben doorgebracht in een omgeving die deze elementen stimuleert zijn hier waarschijnlijk gemakkelijker toe in staat of doen dit automatisch. Daarnaast kunnen ze dankzij hun universitaire opleiding eenvoudiger

wetenschappelijke kennis delen en weten ze waar ze deze kennis kunnen vinden. Deze voordelen gelden in alledaagse lessen, maar zeker ook bij het begeleiden van profielwerkstukken. Verder kunnen universitair opgeleide leraren hun leerlingen een realistisch beeld geven van studeren aan de universiteit en van specifieke opleidingen in hun vakgebied. Vanuit het belang van universiteitsvoorbereiding van vwo-leerlingen gezien is het dus urgent dat er maatregelen worden genomen om het aantal universitair opgeleide leraren te verhogen.

5.4 Beperkingen en aanbevelingen voor vervolgonderzoek

Een belangrijke beperking van dit proefschrift is dat slechts één studie een longitudinaal design had (Hoofdstuk 5) en dat veel relaties tussen factoren correlationeel waren (Hoofdstukken 4 en 7). Om sterkere conclusies te kunnen trekken, met name wat betreft de samenhang tussen kenmerken van leerlingen op het vwo en hun latere prestaties op de universiteit, is meer longitudinaal onderzoek noodzakelijk. Verder zijn veel factoren buiten beeld gebleven, omdat de focus lag op motivationele en gedragsmatige leerling- en studentkenmerken. Uit de overzichtsstudie (Hoofdstuk 3) kunnen we opmaken dat veel andere factoren ook belangrijk zijn, zoals persoonlijkheidskenmerken en kenmerken van de leeromgeving op de universiteit. Tot slot geldt dat de resultaten in dit proefschrift slechts beperkt generaliseerbaar zijn naar andere landen, omdat het sterk gedifferentieerde Nederlandse onderwijssysteem – het bestaan van een afzonderlijk type voortgezet onderwijs dat specifiek voorbereidt op universitair onderwijs – internationaal niet gangbaar is.

Voor vervolgonderzoek naar de transitie is het aan te raden dat meer longitudinaal onderzoek opgezet wordt dat van start gaat vóór de profielkeuze in leerjaar 3 en leerlingen volgt tot en met in ieder geval het eerste jaar op de universiteit. In een dergelijk onderzoek moeten vooral ook factoren van de vwo-leeromgeving worden betrokken, zodat sterk onderbouwde aanbevelingen kunnen worden gedaan om universiteitsvoorbereiding op het vwo te verbeteren. In het bijzonder kan systematisch worden onderzocht of zelfselectie de oorzaak is dat oud-natuurprofielleerlingen beter presteren op de universiteit of dat een natuurprofiel leerlingen beter voorbereidt op de universiteit dan een maatschappijprofiel, en zo ja, welke profielspecifieke elementen van de leeromgeving of leerinhoud hieraan bijdragen. Ook is het aan te raden dat wordt onderzocht hoe de voorbereiding op de eindexamens zich verhoudt tot universiteitsvoorbereiding en hoe de inhoud van de eindexamens zich verhoudt tot de kennis en vaardigheden die

nodig zijn op de universiteit. Daarnaast moet het kwantitatieve onderzoek onder leerlingen worden aangevuld met kwalitatief onderzoek en moeten de relevante partijen die in dit proefschrift niet aan bod zijn gekomen worden bevraagd, zoals eerstejaarsstudenten en docenten op de universiteit.

Vragenlijsten

1 *Need for cognition* (in Hoofdstukken 4 en 5)

Geef per uitspraak aan in hoeverre deze bij jou past.
1 = past helemaal niet bij mij
2 = past niet echt bij mij
3 = weet niet precies
4 = past redelijk bij mij
5 = past helemaal bij mij

1. Als ik moet kiezen, ben ik liever bezig met een ingewikkeld dan met een eenvoudig probleem.
2. Ik ben iemand die graag alles wil begrijpen.
3. Ik vind het leuk om te theoretiseren of met abstracte ideeën te spelen.
4. Ik doe liever iets waarbij weinig nagedacht hoeft te worden dan iets wat mijn denkvermogen sterk op de proef stelt. (R)
5. Ik denk liever na over kleine dagelijkse dingen dan over langetermijnprojecten. (R)
6. Ik houd van situaties waarin veel nagedacht moet worden.
7. Ik hoef niet per se veel te weten. (R)
8. Ik geniet echt van een taak waarin er een nieuwe oplossing voor een probleem gezocht moet worden.
9. Het idee om nieuwe denkmanieren te leren trekt me niet bijzonder aan. (R)
10. Ik puzzel de dingen graag zelf uit.
11. Ik houd ervan om abstract te denken.
12. Ik houd van taken waarbij weinig nagedacht hoeft te worden als je ze eenmaal geleerd hebt. (R)
13. Ik doe liever iets intellectueels dan iets waarbij je niet veel hoeft na te denken.
14. Als een oplossing blijkt te werken, hoef ik niet te weten hoe of waarom die precies werkt. (R)
15. Van complexe zaken wil ik doorgaans graag weten hoe ze in elkaar zitten.
16. Ik ben nieuwsgierig.
17. Ik probeer situaties te vermijden waarin ik lang en diep over iets moet nadenken. (R)
18. Ik beland vaak in situaties waarin ik met mensen aan het discussiëren ga over onderwerpen die niet eens mijn persoonlijke interesse hebben.

(R) = andersom gecodeerd

2 Wetenschappelijke interesse en motivatie

Wetenschappelijke interesse (*academic interest;* Hoofdstuk 4)

Geef bij onderstaande uitspraken aan in hoeverre je het met de uitspraak eens bent.
1 = helemaal mee eens
2 = redelijk mee eens
3 = redelijk mee oneens
4 = helemaal mee oneens

1. Ik ben nieuwsgierig naar wat voor wetenschappelijke dingen je allemaal kunt doen in mijn profiel.
2. Het lijkt mij leuk om (nieuwe) wetenschappelijke kennis op te doen.
3. Het lijkt mij leuk om onderzoek te doen.
4. Ik overweeg een carrière in de wetenschap.
5. Ik heb veel zin in het studeren aan de universiteit.
6. Ik hoop dat ik later een baan heb waarin ik ook een deel van de tijd onderzoek mag doen.

Wetenschappelijke interesse (*academic interest*; Hoofdstuk 5)

Geef steeds aan in hoeverre je het met de stelling eens bent.
1 = helemaal mee oneens
2 = redelijk mee oneens
3 = neutraal
4 = redelijk mee eens
5 = helemaal mee eens

1. Ik word al nerveus als ik er aan denk om zelf in de wetenschap te werken. (R)
2. Ik denk dat de wetenschappelijke manier van denken erg verschilt van hoe ik denk en redeneer. (R)
3. Als het in een gesprek over wetenschap gaat, kan ik het meestal goed volgen.
4. Als ik het woord 'wetenschap' hoor, krijg ik een negatief gevoel. (R)
5. Ik zou het leuk vinden om me te verdiepen in een wetenschap.
6. Het zoeken naar nieuwe wetenschappelijke kennis lijkt me saai. (R)

7. Ik wil geen wetenschapper worden. (R)
8. Ik zou graag wetenschappelijke problemen op willen lossen, alleen of samen met anderen.
9. Misschien zal ik geen grote ontdekkingen doen, maar werken in de wetenschap zou leuk zijn.
10. Werken in de wetenschap lijkt me niet leuk, want dan moet je veel te veel studeren. (R)
11. Werken in een laboratorium lijkt me leuk.
12. Ik ben nieuwsgierig naar welke wetenschappelijke dingen je allemaal kunt doen in mijn profiel.
13. Ik heb veel zin in het studeren aan de universiteit.
14. Het lijkt mij leuk om (nieuwe) wetenschappelijke kennis op te doen.
15. In mijn toekomstige baan moet het mogelijk zijn dat ik me verder kan verdiepen in een bepaald kennisgebied.
16. Ik hoop dat ik later een baan heb waarin ik ook een deel van de tijd onderzoek mag doen.
17. Ik overweeg een carrière in de wetenschap.

Wetenschappelijke motivatie (*academic motivation*; Hoofdstuk 7)

Lees de stelling en kies in hoeverre je het met de stelling eens bent.
1 = helemaal mee oneens
2 = redelijk mee oneens
3 = neutraal
4 = redelijk mee eens
5 = helemaal mee eens

1. Het zoeken naar nieuwe wetenschappelijke kennis is saai. (R)
2. De wetenschappelijke manier van denken verschilt erg van hoe ik denk en redeneer. (R)
3. Ik overweeg een carrière in de wetenschap.
4. Ik hoop dat ik later een baan heb waarin ik ook een deel van de tijd onderzoek mag doen.
5. Als het in een gesprek over wetenschap gaat, kan ik het meestal goed volgen.
6. Als ik het woord 'wetenschap' hoor, krijg ik een negatief gevoel. (R)
7. Ik vind het leuk om me te verdiepen in een wetenschap.

8. Ik wil geen wetenschapper worden. (R)
9. Ik zou graag wetenschappelijke problemen op willen lossen, alleen of samen met anderen.
10. Misschien zal ik geen grote ontdekkingen doen, maar werken in de wetenschap zou leuk zijn.
11. Ik heb een positief gevoel over wetenschap.
12. Werken in de wetenschap lijkt me niet leuk, want dan moet je te lang doorleren. (R)
13. In mijn toekomstige baan moet het mogelijk zijn dat ik me verder kan verdiepen in een bepaald kennisgebied.

3 Betrokkenheid (engagement; Hoofdstukken 4 en 5)

Geef per uitspraak aan in hoeverre deze bij jou past.
1 = past helemaal niet bij mij
2 = past niet echt bij mij
3 = weet niet precies
4 = past redelijk bij mij
5 = past helemaal bij mij

Gedragsmatige betrokkenheid (*behavioural engagement)*
1. In de klas doe ik actief mee.
2. Ik doe net genoeg voor school om voldoende te staan. (R)
3. Ik probeer mijn best te doen voor school, zelfs bij stof of bij vakken die ik niet interessant vind.
4. Ik let goed op in de les.
5. Ik leer altijd voor toetsen.
6. Als ik goede cijfers haal, is dat omdat ik hard werk voor school.
7. Ik plan tijd in voor huiswerk en leerwerk.
8. Ik doe erg mijn best voor school.

Affectieve betrokkenheid: school leuk vinden (*affective engagement: liking school*)*
9. De meeste lessen op school vind ik leuk.
10. Als de leraar nieuwe dingen uitlegt, verveel ik me. (R)
11. Leren op school is saai. (R)
12. Als we in de klas aan het werk zijn, verveel ik me. (R)
13. Ik kijk vaak naar de tijd om te zien of de les al is afgelopen. (R)

Affectieve betrokkenheid: school belangrijk vinden (*affective engagement: valuing school*)*
14. De dingen die we op school leren, vind ik interessant.
15. School is zonde van mijn tijd. (R)
16. Als ik mijn best doe voor school, merk ik dat ik beter word in iets.
17. Ik leer veel van de lessen op school.
18. Op school leer je belangrijke dingen.
19. Veel dingen die we op school leren, zijn nutteloos. (R)

Vwo-toewijding (*commitment)**

20. Ik denk er vaak over om te stoppen met school of naar het havo te gaan. (R)
21. Nu stoppen met school of naar een lager niveau gaan is zonde.
22. Het gaat mij lukken om mijn vwo-diploma te halen.
23. Na het vwo wil ik naar de universiteit.

*Niet gebruikt in dit proefschrift.

4 Buitenschoolse wetenschappelijke activiteiten (*out-of-school academic activities;* Hoofdstuk 4)

Geef aan hoe vaak je onderstaande activiteiten doet in je vrije tijd.
1 = nooit
2 = ongeveer 1 keer per maand
3 = ongeveer 1 keer per week
4 = meerdere keren per week
5 = dagelijks

1. Tv-programma's met een wetenschappelijk karakter bekijken (bijv. Pavlov, Discovery Channel).
2. Populair-wetenschappelijke tijdschriften lezen (bijv. Kijk, Quest of Psychologie Magazine).
3. Websites over wetenschappelijke onderwerpen bezoeken.
4. Wetenschappelijke boeken lezen.
5. Met familie of vrienden over wetenschap praten.
6. Artikelen over de wetenschap in kranten of op nieuwswebsites lezen (bijv. nu.nl).

5 Academische zelfeffectiviteit

Academische zelfeffectiviteit (*academic self-efficacy*; Hoofdstuk 4)

Geef aan hoe goed je denkt dat je bent in de onderstaande taken.
1 = slecht
2 = matig
3 = redelijk goed
4 = zeer goed

1. Een goede wetenschappelijke onderzoeksvraag bedenken over waarom er steeds meer geweld lijkt te zijn op straat.
2. Een wetenschappelijk boek lezen in je eigen interessegebied en de inhoud ervan begrijpen.
3. De kern halen uit een wetenschappelijke tekst over het veranderen van de opvoedingscultuur in de westerse wereld.
4. Een essay (opstel) schrijven over een wetenschappelijk onderwerp, gebaseerd op diverse wetenschappelijke artikelen.
5. Drie wetenschappelijke boeken grondig bestuderen voor een tentamen op de universiteit.
6. Het herkennen van een wetenschappelijk vraagstuk in een krantenartikel over een gezondheidsprobleem.

Academische zelfeffectiviteit (*academic self-efficacy*; Hoofdstukken 5 en 7)

Hoeveel vertrouwen heb je erin dat je onderstaande activiteiten op de universiteit goed zou kunnen uitvoeren?*
1 = ik heb er geen vertrouwen in dat ik dat goed kan
2 = ik heb er niet zo veel vertrouwen in dat ik dat goed kan
3 = neutraal
4 = ik heb er redelijk veel vertrouwen in dat ik dat goed kan
5 = ik heb er veel vertrouwen in dat ik dat goed kan

Zelfeffectiviteit: begrip (*self-efficacy*: understanding)
1. Een vraag beantwoorden tijdens een hoorcollege.
2. Een vraag beantwoorden tijdens een werkcollege.

3. Een goed cijfer halen op een tentamen met open vragen.
4. Een hoorcollege over een moeilijk onderwerp begrijpen.
5. Begrijpen van het meeste dat je leest in een studieboek.
6. Begrijpen van het meeste dat je hoort tijdens een hoorcollege.
7. Inhoud van een hoorcollege toepassen in een werkcollege.
8. Moeilijke stukken in een tekstboek begrijpen.

Zelfeffectiviteit: inzet (*self-efficacy*: effort)

9. Altijd naar hoor- en werkcolleges gaan (behalve als je ziek bent o.i.d.).
10. Altijd naar hoor- en werkcolleges gaan, ook als je het vak saai vindt.
11. Het leren voor een tentamen verspreiden over een langere periode in plaats van alleen maar te leren op de dag ervoor.
12. Moeite doen om de inhoud van een vak te begrijpen dat je niet interesseert.

Zelfeffectiviteit: sociaal (*self-efficacy*: social)**

13. Dingen regelen en organiseren als bestuurslid van een studie- of studentenvereniging.
14. Deelnemen aan studentgerichte activiteiten buiten je studie (bijv. sporten of activiteiten van een studie- of studentenvereniging).
15. Met anderen samenwerken aan een groepsopdracht.
16. Nieuwe vrienden maken op de universiteit.

*In de vragenlijst voor eerstejaars studenten (Hoofdstuk 7) was deze vraag iets anders geformuleerd, aangezien zij al ervaring hadden met de meeste gevraagde gedragingen.
**Niet gebruikt in dit proefschrift.

6 Leerstrategieën (*learning strategies*; Hoofdstuk 5 (allemaal) en Hoofdstuk 7 (zelfregulatie)

De volgende vragen gaan over jouw leerstrategieën en studievaardigheden. Er zijn geen goede of foute antwoorden; het gaat erom hoe jij leert. Beantwoord de vragen zo waarheidsgetrouw mogelijk. Je kunt kiezen uit zeven antwoordmogelijkheden die variëren van 'helemaal niet waar voor mij' (1) tot 'helemaal waar voor mij' (7). De vragen zijn in het algemeen gesteld en gaan dus niet over één vak in het bijzonder. Als je twijfelt, kies dan de antwoordoptie die jouw gedrag bij de meeste vakken omschrijft.

1 = helemaal niet waar voor mij
2 = grotendeels niet waar voor mij
3 = meer niet waar dan waar
4 = weet niet precies
5 = meer waar dan niet waar
6 = grotendeels waar voor mij
7 = helemaal waar voor mij

Oppervlakkig leren (*surface learning*)

Herhaling (*rehearsal*)
1. Ik leer vaak door de studiestof voor mezelf te herhalen.
2. Ik leer vaak door mijn aantekeningen en de stof in het boek steeds weer opnieuw door te lezen.
3. Ik leer belangrijke woorden uit mijn hoofd, zodat ik aan de hand daarvan belangrijke concepten kan onthouden.
4. Als ik leer, maak ik lijstjes van belangrijke onderdelen van de stof en leer ik die lijstjes uit mijn hoofd.

Diep leren (*deep learning*)

Elaboratie (*elaboration*)
5. Bij het leren combineer ik de informatie uit het boek en de informatie uit de lessen.

6. Wat ik leer in het ene vak probeer ik in verband te brengen met wat ik leer in andere vakken.
7. Als ik iets nieuws lees voor een vak, probeer ik dat in verband te brengen met wat ik al weet over dat onderwerp.
8. Bij het leren maak ik samenvattingen van de belangrijkste stof in het boek en in mijn aantekeningen.
9. Ik probeer de stof te begrijpen door de informatie uit het boek te koppelen aan wat de leraar tijdens de lessen heeft verteld.
10. Ik probeer de stof die ik lees in het boek toe te passen tijdens andere lesactiviteiten zoals in een discussie in de klas.

Organisatie (*organisation*)
11. Als ik veel tekst moet leren, maak ik een schematisch overzicht van de tekst om mijn gedachten te ordenen.
12. Als ik moet leren, zoek ik in de stof in het boek en in mijn aantekeningen van de les naar de belangrijkste informatie.
13. Ik maak tabellen, schema's of figuren om de leerstof te ordenen.
14. Tijdens het leren neem ik mijn aantekeningen van de les door en maak ik een overzicht van belangrijke begrippen.

Kritisch denken (*critical thinking*)
15. Vaak twijfel ik aan wat de leraar vertelt of wat er in het boek staat en bepaal ik zelf of de informatie juist is.
16. Als er tijdens de les of in het boek een theorie, interpretatie of conclusie wordt gepresenteerd, probeer ik te beslissen of er daarvoor wel sterk bewijs is.
17. Ik gebruik wat ik leer op school om mijn eigen ideeën over een onderwerp te vormen.
18. Ik vergelijk mijn eigen ideeën/opvattingen over een onderwerp met wat ik over dat onderwerp leer op school.
19. Ik bedenk vaak alternatieve verklaringen voor uitspraken of conclusies die ik op school hoor.

Metacognitie (*metacognitive learning*)
20. Tijdens de les mis ik vaak belangrijke informatie, omdat ik aan andere dingen zit te denken. (R)
21. Bij het bestuderen van een studieboek stel ik mezelf vragen om de belangrijkste informatie uit de tekst te halen.

22. Als ik een stuk tekst niet goed begrijp, lees ik het nog een keer door en probeer ik te snappen wat er staat.
23. Ik lees een moeilijke tekst op een andere manier dan een gemakkelijke tekst.
24. Voordat ik een nieuw hoofdstuk/stuk tekst ga bestuderen, blader ik het door om te zien hoe het is opgebouwd.
25. Ik stel mezelf vragen om te controleren of ik de stof goed begrijp.
26. Hoe ik iets leer hangt af van het vak en van wat de leraar belangrijk vindt.
27. Als ik iets heb gelezen voor school, heb ik later vaak geen idee meer waar het over ging. (R)
28. Bij het leren bepaal ik eerst wat ik over een onderwerp moet weten in plaats van meteen de hele tekst te bestuderen.
29. Tijdens het leren probeer ik erachter te komen welke begrippen ik niet goed begrijp.
30. Tijdens het leren stel ik doelen voor mezelf om mijn leeractiviteiten richting te geven.
31. Als ik tijdens de les iets niet goed begrijp, zoek ik later uit hoe het precies zit.

Zelfregulatie (*self-regulated learning*)

Tijd- en omgevingsmanagement (*time and environmental management*)
32. Ik leer meestal op een plek waar ik me goed kan concentreren.
33. Ik gebruik de tijd die ik heb om te leren goed.
34. Ik vind het moeilijk om me aan een studiewijzer of studieplanning te houden. (R)
35. Ik heb een vaste plek speciaal om huiswerk te maken.
36. Ik zorg ervoor dat ik elke week bijblijf met de leesstof en opdrachten.
37. Ik ga altijd naar de les.
38. Vaak heb ik het te druk met andere activiteiten of bezigheden om tijd aan school te besteden. (R)
39. Ik heb bijna nooit tijd om mijn aantekeningen of de lesstof voor een toets opnieuw door te kijken. (R)

Inzetregulatie (*effort regulation*)
40. Als het huiswerk vervelend of saai is, houd ik er vaak eerder mee op dan ik van plan was. (R)
41. Ik doe erg mijn best om goede cijfers te halen, ook al vind ik de stof of een vak niet leuk.

42. Als de stof moeilijk is, geef ik het op of leer/maak ik alleen de makkelijke onderdelen. (R)
43. Zelfs als de leerstof of het maakwerk saai en oninteressant is, lukt het mij om door te werken totdat ik klaar ben.

7 Academische aanpassing (*academic adjustment*; Hoofdstukken 5 en 7)

De volgende vragen gaan over hoe het op dit moment met je gaat op de universiteit en wat je van de opleiding vindt. Lees de stelling en kies in hoeverre je het ermee eens bent.

1 = helemaal mee oneens
2 = redelijk mee oneens
3 = neutraal
4 = redelijk mee eens
5 = helemaal mee eens

Motivatie (*motivation*)

1. Ik weet waarom ik deze opleiding doe.
2. Ik heb duidelijke academische doelen.
3. Ik vind het behalen van een universitair diploma belangrijk.
4. Ik heb zo mijn twijfels bij de waarde van een universitair diploma. (R)
5. Ik vind studeren leuk.
6. De meeste van mijn interesses zijn niet gerelateerd aan deze opleiding. (R)

Toepassing (*application*)

7. Ik houd de leerstof van de vakken die ik volg goed bij.
8. Ik werk niet zo hard aan mijn studie als ik zou moeten. (R)
9. Ik ben niet gemotiveerd om te studeren. (R)
10. Ik ga altijd naar college.

Prestatie (*performance*)

11. Ik vind de stof die we krijgen en/of de opdrachten die we moeten doen moeilijk. (R)
12. Ik functioneer niet goed tijdens toetsen/tentamens. (R)
13. Ik ben tevreden over hoe ik presteer hier op de universiteit.
14. Ik voel me niet slim genoeg voor deze opleiding. (R)
15. Ik gebruik mijn tijd om te studeren niet efficiënt. (R)
16. Ik vind het leuk om papers/essays te schrijven voor vakken.
17. Ik heb er moeite mee om me te concentreren tijdens het studeren. (R)
18. Het gaat niet goed met mijn inzet voor deze studie. (R)
19. Ik heb vaak opstartproblemen als ik wil gaan studeren. (R)

Omgeving (*environment*)

20. Ik ben tevreden met de vakken die ik volg.
21. Ik ben tevreden met de kwaliteit van de vakken die ik volg.
22. Ik ben tevreden met het programma/curriculum van deze opleiding.
23. Ik ben tevreden met de professoren en/of docenten van deze opleiding.
24. Ik ben tevreden met het academische niveau van mijn opleiding.

Interviewprotocol

Interviewprotocol vwo-leraren (Hoofdstuk 6)

Introductie

Dit is een heel open interview, met vrij brede, open vragen. Ik nodig u dan ook uit om vooral uit te weiden en concrete voorbeelden te geven als dat mogelijk is. Het interview gaat – zoals u al weet – over universiteitsvoorbereiding. Waar ik vooral in geïnteresseerd ben, is **of u als leraar bezig bent met universiteitsvoorbereiding, hoe u dat doet, en of u dat uw rol vindt als leraar.**

Het interview wordt opgenomen, gaat u daarmee akkoord? Uiteraard worden de gegevens anoniem verwerkt.

Indien toestemming voor opname: Dan gaan we nu van start met de eerste vraag.

Wat zijn volgens u belangrijke algemene kenmerken (wat betreft kennis, vaardigheden en/of houding) waarover een startende student op de universiteit moet beschikken?
- Waarom denkt u dat deze belangrijk zijn?
- In hoeverre beschikken uw leerlingen aan het eind van 6 vwo hierover denkt u?

Besteedt u in uw lessen aandacht aan het voorbereiden van leerlingen op de universiteit?
- Hoe? Concrete voorbeelden?
- Hoe vaak?
- Waarom wel/niet?
- Effect op leerlingen?

Hoe is dat in het algemeen bij u op school; zijn leraren bewust bezig met het voorbereiden op de universiteit?
- Hoe staat dit in verhouding tot het voorbereiden op het examen?

Hoort u wel eens van oud-leerlingen hoe het met hen gaat op de universiteit?
- Wat zijn hun verhalen zoal?
- Is er kennis of zijn er vaardigheden die ze missen?

Vindt u het, als leraar <*vak*>, dat universiteitsvoorbereiding een taak van u is?
- Vindt u dit een belangrijke taak?

Leent uw vak zich goed voor universiteitsvoorbereiding?
- Waarom wel/niet?
- Welke vakken zouden zich er beter/minder goed voor lenen?

Ik wil het graag ook hebben over het studiekeuzeproces. Heeft u zicht op hoe uw leerlingen de studiekeuze maken?
- Wat vindt u van de manier waarop zij dit doen?
- Heeft u een rol in het studiekeuzeproces?
- Hoe ziet die rol eruit?
- Bent u nog goed thuis in het aanbod van universitaire opleidingen in uw vakgebied?

Doet uw school veel aan begeleiding bij het studiekeuzeproces?
- Vindt u de studiekeuze iets van de leerling (en ouders) zelf of ook iets waarbij de school actief betrokken is?
- Wie in de school zijn daarbij betrokken? Rol decaan, mentor, leraar.

Tot slot nog enkele algemene, samenvattende vragen.

Zou u zelf meer of minder tijd en/of aandacht willen besteden aan universiteitsvoorbereiding?
- Indien meer: Zijn er belemmerende factoren om dat niet te doen?

Vindt u dat u als leraar voldoende bent opgeleid/toegerust om leerlingen voor te bereiden op de universiteit?

In de lesmethodes die u gebruikt, wordt daar aandacht gegeven aan universiteitsvoorbereiding? Bijvoorbeeld dat er informatie wordt gegeven over opleidingen of beroepen die te maken hebben met een bepaald deel van de stof?
Over het algemeen genomen, zou u zeggen dat u veel bezig bent met de ontwikkeling van vaardigheden, houding en kennis die ze nodig hebben op de universiteit?

Indien duidelijk naar voren komt uit het interview dat leraar vindt dat de stap van vwo naar universiteit groot is: Wat is er volgens u nodig om de stap van vwo naar universiteit voor leerlingen kleiner te maken?

Ok, dat was het. Heeft u zelf nog aanvullende opmerkingen over dit onderwerp?

…

Hartelijk bedankt!

Acknowledgements

As a small town girl with initially limited ambitions and not much knowledge about the world outside Brabant, thirteen years ago I would never have guessed I would end up writing a PhD thesis. Looking back, this career path in academia makes sense though: In primary school I wanted to be either a teacher or a writer and my secondary school career test told me I should be a scientist (the laboratory kind of scientist, but well, these tests are known for their margin of error).

My PhD journey has mostly been enjoyable, and definitely enriching. Many people have contributed to making it an overall positive experience, and although I am neither particularly a fan of conventions nor good at expressing (positive) feelings, I will use this space to acknowledge those who deserve it.

The serious part: Academic acknowledgements

First of all, I have been extremely lucky to have had a great daily supervisor and copromotor. Ellen, you were always there when I needed you, you gave very useful and clear feedback on my written work, and your positive and practical attitude made it pleasant and efficient to collaborate with you. Thank you for everything!

Wim, you challenged me and had faith in me, which in my opinion are two main qualities of a promotor. Whenever we had accomplished something, e.g., an analysis with nice results, a good-looking model, or another paper accepted, you would always mention you were proud of me, which greatly contributed to my self-efficacy as a social scientist. Thank you!

Throughout my four PhD years, I have moved offices many times (almost as often as I have moved house, which is a lot). I am very happy that I ended up with you, Marjon. I could not wish for a better office mate: You are cheerful, even when I am in one of my I-hate-the-world-fuck-you-all-moods; always available for a talk, work-related or not; always up for a coffee; and you never run out of chocolate. I hope we can keep sharing an office for many years to come and I am happy that you are collaborating with me on both of my postdoc projects. PS. Sorry for sometimes sneakily throwing leftover coffee in your plants, but I read that it definitely doesn't kill them and may even make them stronger.

Janneke, I'd like to thank you for agreeing to take up the (probably very tiring) task of checking my Introduction and Discussion: You didn't hesitate for a second when I asked you to do this – "comes for the baker!" – and consequently you made sure there is no Dunglish in my thesis anymore and that all (or at least

most) sentences are comprehensible and readable instead of only serving the function of giving the very small number of people who actually read this thing huge headaches thanks to my affinity with complex sentence structures and using redundant words, and my tendency to include at least five commas, two dashes, six brackets (mainly containing useless information), and one unnecessary colon into one sentence. Furthermore, I am also grateful for your insights as a former secondary school teacher. It's reassuring that the things I bring up in my thesis also resonate with the people in the field.

Talking about the field, I am extremely thankful that there were 16 schools that participated in this research at some point (either in the pilot or in the large-scale data collection). It was a lot to ask to have the upper-grade students complete my questionnaires in one or even two school hours, which made some of these adolescents quite cranky, so at least I hope that the schools found the reports about the results informative and helpful. In addition, even though none of them will read this so this makes absolutely no sense, I'd like to thank the more than 2,000 students from grades 10, 11, 12, and the first year of university who completed the questionnaires. Last but not least, I thank the pre-university teachers who let me interview them about their ideas and practices regarding university preparation. Without all of your time and input, this research would not have been possible.

Vincent and Dorien from the University of Antwerp, and Jasperina from our university, thank you very much for collaborating with me on the systematic review of predictors of academic success in Dutch and Flemish higher education (a.k.a. Chapter 3). I know it ended up being a much bigger project than we imagined and I am thankful that you were all committed until the end.

Last in this part, I'd like to express my gratitude to the members of the assessment committee, Adriaan Hofman, Klaas van Veen, and Sabine Severiens, for taking the time to read my thesis and also for taking part in the examining committee of my defence.

Mensen die ik al lang ken en die me wonderbaarlijk genoeg nog steeds niet zat zijn

Constante factoren zijn niet alleen cruciaal in onderzoek, maar ook in het leven. De afgelopen dertien jaar ben ik naar Groningen verhuisd, terug naar Brabant, naar Leeuwarden, naar Nijmegen, en weer terug naar Groningen. Het behouden van stabiele sociale contacten in zo'n veranderlijke woonsituatie is uitdagend, en onvermijdelijkerwijs you win some and you lose some. Daarom ben ik bijzonder

dankbaar dat er een aantal mensen is met wie het contact 'aan' is gebleven ondanks de afstand en ondanks de situatie dat de meesten van hen zich tegenwoordig in de huisje-boompje-beestje-baby-fase bevinden of zich langzaamaan in die richting ontwikkelen. Mark, Diana, Rudy, Yvonne, Ries, en René uit Meijel; Karin, Malu, en Kim van het gymnasium; en Lieneke, Nikky, Max, Richard, en Esther die ik ken vanaf mijn studententijd: Bedankt voor het bierdrinkgezelschap, de struiktheemomenten (ik snap dat fenomeen overigens nog steeds niet, zo'n half bos in je thee), festivals, logeerpartijen, etentjes, concerten, en andere memorabele momenten. Ik hoop dat er nog vele zullen volgen. Een bijzonder bedankje tot slot voor Majken, voor alle doldwaze Selwerdavonturen back in the day en nu voor het ontwerpen van de cover van mijn proefschrift.

The PhD community

In my second year, at the PhD day in 2014, I met Ni, who told me about this crazy little thing called GOPHER (for those unfamiliar with it, you can see it as an open club of UG PhD students who try to solve all their problems by drinking substantive amounts of alcohol (with the exception of certain people who prefer coke and desserts)). Ni then convinced me to join the GOPHER board. So I did, and as a result I met many PhD students from other faculties and I gained some useful organisational and interpersonal skills (e.g., how to deal with weird people), and got very fast in calculating the number of beers one can get for a certain amount of money (this skill is not to be underestimated). I found GOPHER to be such a welcome distraction from work that I stayed on board for three years. Many successful events, fun times, enjoyable meetings, and interesting gossip rounds took place, for which in particular I'd like to thank Ni, Brenda, Linda, Wouter, Simon, Eric, Antonija, Daniela, Morten, Diana, and Xu (although the last one still has to make it up to me for never finishing the carnaval event report).

Furthermore, a big thanks to all the people who joined GOPHER events and with whom I have had many (good and Heineken) beers, (interesting and boring) conversations, and (mostly) fun times. A special thanks to the GSSE PhD council who always allowed me at their monthly borrels despite not being in their graduate school, although I regularly had to pay the price for that when some stubborn die-hard science people tried (and, admittedly, succeeded) to get on my nerves by claiming social science isn't an actual scientific field – I suggest we end this discussion once and for all, for which I kindly refer you to proposition 9 in this thesis.

Last in this section, I'd like to thank some people from the Groningen PhD crowd whom I particularly liked hanging out with because of the interesting conversations, the mutual complaining, the efficient drinking pace, the good music taste and enjoyable concert or festival visits, the high quality gossip, and the staying out way too late (for my age) in the city in places that shall not be named out loud. Obviously not all reasons apply to everyone, but I think you can figure that out for yourselves. Olivier, Elwin, Christian, Daniel, Daniele, Martijn, Markus, and Sabrina, thank you all!

More boards, less bored

In the beginning of 2016, some other BSS PhD students shared my frustration that our faculty did not have a PhD council. As a consequence, we established a council ourselves. Dorijn, Lonneke (I hope you have found your peace), Marloes, Jet, Vera, and Anne: Thank you for making the council a success and for the pleasant meetings!

It might have been a good idea to cut down on the extracurricular activities in the last year of a PhD. But then again, I had never been part of the PhD Day organisation and obviously this was my last chance. So at the end of 2016 I joined the Program Team of the PhD Day 2017. The Program Team consisted of ambitious people from different backgrounds – all of whom were very nice and efficient to work with. Ximena, Minita, Sophie, Laura, and Raúl: Thank you for the good times and your effort in making the 2017 PhD Day's programme awesome.

How the academic journey continues

Due to being involved in GOPHER and the BSS PhD council, and attending talks about researcher education at conferences, I got more and more interested in the PhD trajectory as a subtopic of educational research. Hence, I am very happy that one of my postdoc projects focuses on PhD students. I'd like to thank Lou de Leij and Marjan Koopmans from the Groningen Graduate Schools for the opportunity to do this research.

By interviewing pre-university teachers and students I realised once again how important it is for students to have knowledgeable and enthusiastic teachers, not only because from these teachers students will likely learn the most and because they can help them get ready for university, but also because passionate teachers have the means to trigger students' interest for a certain field or topic. Unfortunately, some school subjects, especially the science subjects, are suffering

from teacher shortages. In this second postdoc project, I am investigating science students' motives to become a teacher. I'd like to express my gratitude to Martin Goedhart and the others at the Institute for Science Education and Communication for warmly welcoming me into this research group.

Showtime

I thank my para-/partynymphs Eric and Nikky for helping me organise everything and hopefully also for making sure I will survive the d-day. I am also extremely grateful that Richard, Elwin, Pieter, and Nikky enthusiastically agreed to form a one-time band to perform at my defence party, which is super awesome. I hope this plan turns into reality, because I can't wait to see you play. (No pressure though, I will still like you if you suck.)

En dan denk ik aan Brabant[2]

Als eerste wil ik ons pap en mam bedanken. Dankzij hen heb ik voor het doen van een PhD nuttige waarden geïnternaliseerd, zoals dat je altijd je best moet doen, dat een zesje simpelweg een beroerd resultaat is als je de capaciteiten hebt om het veel beter te doen, en dat je moet doorzetten als het eens tegenzit. Ik denk niet dat ik zonder deze instelling zover was gekomen en alle donkere perioden had overwonnen. Mama, bedankt ook voor de interesse in mijn belevenissen, ondanks dat het voor jullie lastig voor te stellen is wat zo'n promotietraject precies inhoudt ("Hoe ging je spreekbeurt in Amerika?"). Papa, superbedankt voor alle praktische hulp bij de diverse verhuizingen door het hele land heen en voor de hulp bij het fixen van mijn autoproblemen, zelfs nu ik geen Volvo meer heb. Fijn ook dat je me nooit uitlacht, zelfs niet als ik je vanaf een tankstation opbel omdat ik ben vergeten wat voor benzine er ook alweer in mijn auto moet. Loes en Bep, ik ben blij dat jullie alletwee bij mijn promotie aanwezig kunnen zijn! Peetoom Mario en peettante Anne-Mieke: Bedankt dat jullie nog steeds ieder jaar voor mijn verjaardag helemaal naar Groningen komen. Dat doet me altijd veel deugd. Tante Anne-Mieke, gezellig dat we elkaar bovendien elk jaar twee keer ergens midden in het land treffen om wederzijdse verjaardagscadeaus te verzilveren (ook al is dat soms acht maanden na de betreffende verjaardag). Als laatste een bijzonder bedankje aan ome Ad; Leuk dat je mijn buitenlandavonturen altijd volgde, steeds

2 Ik wilde dit stukje eigenlijk in het Brabants schrijven, maar toen kwam ik tot de conclusie dat mijn Brabants tegenwoordig niet veel verder meer komt dan een zachte g, wat letters aan het einde van woorden inslikken, af en toe een rare klemtoon, en 'ik heb mijn spullen bij' en 'ik ben net aangereden/aangefietst/aangelopen'.

weer originele commentaren wist te geven op mijn foto's, en me van nuttige drankadviezen voorzag. Het is nog steeds niet te geloven dat je een half jaar voor je geplande droompensioen in Spanje daar plots bent overleden. A not so gentle reminder that life is unkind, en er is geen wetenschap in de wereld die daar iets aan kan veranderen.

Groningen, 31 December 2017

AM

About the author

Els Cornelia Maria van Rooij was born in Deurne, Noord-Brabant, on March 14, 1987. After graduating from the local gymnasium she decided it was time for a change of scenery, so in 2005 she moved all the way up north to start studying Educational Sciences at the University of Groningen. She graduated cum laude from the bachelor programme in 2008, and completed her education by obtaining two master degrees: one in Childhood and Youth Studies in 2009 and one in Educational Design, Management, and Policy in 2010. From that point onwards, she let her interests and seemingly random opportunities guide her career choices. First, she worked as an educational consultant back in Brabant. Then, halfway 2011, she thought it was time to try something she had always loved to do: teaching. She moved to Friesland and started in a job as a teacher in the art teacher training programme at a university of applied sciences. She taught courses ranging from developmental psychology to didactics. In the beginning of 2013, she moved to Nijmegen to work at another university of applied sciences, this time as a teacher of a social work degree programme. Although she enjoyed teaching, she started to miss the university environment more and more. This brought her back to Groningen in September 2013, where she worked for four years on her PhD research about the transition from secondary school to university. In addition, she taught the general didactics course in the teacher training programme, she supervised students' research projects, and she supervised students during their internship at a secondary school. After working on her teaching portfolio for a year, she obtained the University Teaching Qualification (UTQ, or BKO) in June 2017. Outside of work, she kept herself busy by being a board member of GOPHER (Groningen Organisation for PhD Education and Recreation) for three years, a member of the PhD council of Behavioural and Social Sciences for 1.5 years, and part of the Program Team for the annual Groningen PhD day for one year. Furthermore, she was a volunteer at Coach4You for three years, which meant she weekly visited a grade 7 student from a disadvantageous background to help him or her with the transition from primary to secondary education.

Els currently works as a postdoctoral researcher at the University of Groningen on two projects. At the Institute for Science Education and Communication of the Faculty of Science and Engineering, she investigates the reasons why science students do or do not choose to pursue a teacher education programme during their

bachelor studies and the factors that influence their success in this programme. At the Research Division Higher Education of the Faculty of Behavioural and Social Sciences, she investigates what individual and institutional factors are related to PhD students' success (i.e., timely completion of the PhD thesis and a smooth transition to their next job), their wellbeing, and their satisfaction with the PhD trajectory.

LinkedIn: https://nl.linkedin.com/in/elsvanrooij
ResearchGate: https://www.researchgate.net/profile/Els_Van_Rooij

List of publications, presentations, and activities

Peer-reviewed published/accepted papers

Van Rooij, E. C. M., Jansen, E. P. W. A., & Van de Grift, W. J. C. M. (2017). Factors that contribute to secondary school students' self-efficacy in being a successful university student. *Research in Post-Compulsory Education, 22*(4), 535-555. DOI 10.1080/13596748.2017.1381301.

Van Rooij, E. C. M., Jansen, E. P. W. A., & Van de Grift, W. J. C. M. (2017). First-year university students' academic success: The importance of academic adjustment. *European Journal of Psychology of Education.* Advance online publication. DOI 10.1007/s10212-017-0347-8.

Van Rooij, E. C. M., Jansen, E. P. W. A., & Van de Grift, W. J. C. M. (2017). Secondary school students' engagement profiles and their relationship with academic adjustment and achievement in university. *Learning and Individual Differences, 54*, 9-19. DOI 10.1016/j.lindif.2017.01.004.

Van Rooij, E. C. M., Brouwer, J., Fokkens-Bruinsma, M., Jansen, E. P. W. A., Donche, V., & Noyens, D. (2018). A systematic review of factors related to first-year students' success in Dutch and Flemish higher education. *Pedagogische Studiën, accepted for publication.*

Van Rooij, E. C. M. & Jansen, E. P. W. A. (2018). "Our job is to deliver a good secondary school student, not a good university student." Secondary school teachers' beliefs and practices regarding university preparation. *International Journal of Educational Research, 88*, 9-19. DOI 10.1016/j.ijer.2018.01.005.

Presentations at conferences

Van Rooij, E. & Jansen, E. (2017). *Pre-university teachers' knowledge, beliefs and practices regarding university preparation.* Paper presented at EARLI 2017, Tampere, Finland.

Van Rooij, E., Jansen, E., & Van de Grift, W. (2017). *The importance of academic adjustment for a successful transition to university.* Part of symposium 'The impact of individual and contextual factors on the first year in higher education, presented at EARLI 2017, Tampere, Finland.

Van Rooij, E. & Jansen, E. (2017). *Pre-university teachers' knowledge, beliefs, attitudes, and practices regarding university preparation.* Paper presented at AERA 2017, San Antonio, United States.

Van Rooij, E., Jansen, E., & Van de Grift, W. (2017). *The importance of academic adjustment in explaining first-year university student success.* Paper presented at AERA 2017, San Antonio, United States.

Van Rooij, E., Brouwer, J., Fokkens-Bruinsma, M., & Jansen, E. (2016). *What factors are important in explaining first-year students' achievement and persistence in Dutch and Flemish higher education? A systematic review.* Part of symposium 'How can we enhance first-year students' achievement and persistence in higher education? Predictors and interventions of academic success in Europe', presented at ECER 2016, Dublin, Ireland.

Van Rooij, E., Jansen, E., & Van de Grift, W. (2016). *Ready for university? Profiling secondary school students on university readiness.* Paper presented at ECER 2016, Dublin, Ireland.

Van Rooij, E., Jansen, E., & Van de Grift, W. (2016). *The transition to university: The importance of academic adjustment and satisfaction with the chosen degree programme for study success in the first year of university.* Paper presented at EARLI-SIG International Higher Education Conference 2016, Amsterdam, Netherlands.

Van Rooij, E., Jansen, E., & Van de Grift, W. (2016). *Differences in secondary school students' university readiness. A latent profile analysis.* European First Year Experience Conference, Gent, Belgium.

Van Rooij, E., Jansen, E., & van de Grift, W. (2015). *Pathways to university readiness in secondary school students: What motivational variables impact students' scientific interest and confidence in skills required at university?* Paper presented at Junior Researchers of EARLI (JURE), Limassol, Cyprus.

Van Rooij, E., Jansen, E., & van de Grift, W. (2014). *Measuring underachievement and university preparedness in pre-university students: Developing an instrument that maps underachievement and students' strengths and weaknesses regarding university preparedness.* Research proposal presented at EARLI-SIG 4 & 17, Leuven, Belgium.

International summer schools attended

Summer 2014: Structural equation modelling, Essex, United Kingdom (Essex Summer School in Social Science Data Analysis)

Summer 2015: Applied multilevel modelling, Ljubljana, Slovenia (European Consortium for Political Research, ECPR)

Courses followed at ICO (Interuniversity Center for Educational Sciences)

Spring 2014: Introductory course
Autum 2014: International Fall School, Blankenberge, Belgium
Winter 2014/2015: Research into higher education
Spring 2015: Analysis of measurement instruments
Spring 2015: Qualitative research analysis
Spring 2015: Different perspectives on and approaches to formative assessment
Autum 2015: Research synthesis including meta-analysis
Autum 2015: National Fall School

Teaching activities

2013-2014; 2014-2015; 2015-2016; 2016-2017: Colleges Algemene Didactiek educatieve master
2013-2014; 2014-2015; 2015-2016; 2016-2017: Begeleiding onderzoek educatieve master
2014-2015; 2015-2016; 2016-2017: Begeleiding stage educatieve minor

Board activities

2014-2015; 2015-2016; 2016-2017: GOPHER (Groningen Organisation for PhD Education and Recreation)
2015-2016; 2016-2017: BSS (Behavioural and Social Sciences) PhD council
2016-2017: PhD Day 2017 Program Team